



# User Manual

V1.3

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This manual supports NetCommander firmware version 1.8

**This page has been left blank intentionally to record your notes and configuration information**

## Important safety instructions

**Thank you for purchasing the NetCommander environment monitoring and control solution from Cuberoot. Please read the following section carefully.**

- This equipment has been designed and manufactured to meet international safety standards. The following safety precautions, if followed, will ensure the safe and reliable operation of the equipment.
- Read the operating instructions.
- Ensure that all connections (mains adapter, serial, Ethernet, input and outputs) are properly terminated.
- Mains should not be connected to any part of this equipment
- Switch off when making or changing the analogue input and output connections.
- Switch off when removing interface cards
- Handle NetCommander carefully.
- Don't continue to operate the equipment if you are in any doubt about it working normally, or if it is damaged in any way - withdraw the mains adapter and consult your dealer.
- Don't allow equipment to be exposed to rain or moisture.
- Do not open NetCommander's case, this may result in damage to the sensitive hardware.
- Do not tamper with the mains adapter as this may expose dangerous voltages.
- Keep away from children, NetCommander is not a toy.
- This product must not be used or specified to replace safety critical systems such as fire alarms. It is also not intended for health monitoring or in situations where life can be put at risk by incorrect operation.

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## 1.0 NetCommander introduction

NetCommander is a web accessible network device for monitoring environmental and equipment alarm status in buildings, server and remote equipment rooms. NetCommander detects threatening conditions such as fire, flood, overheating or equipment failure before equipment is damaged or destroyed. A wide range of sensors, such as temperature, PIR, water, smoke; devices such as camera's and equipment, such as UPS, security and HVAC systems, can be incorporated to provide a complete environment monitoring and control solution. It can also support a number of feature options using its plug and play expansion interface technology.

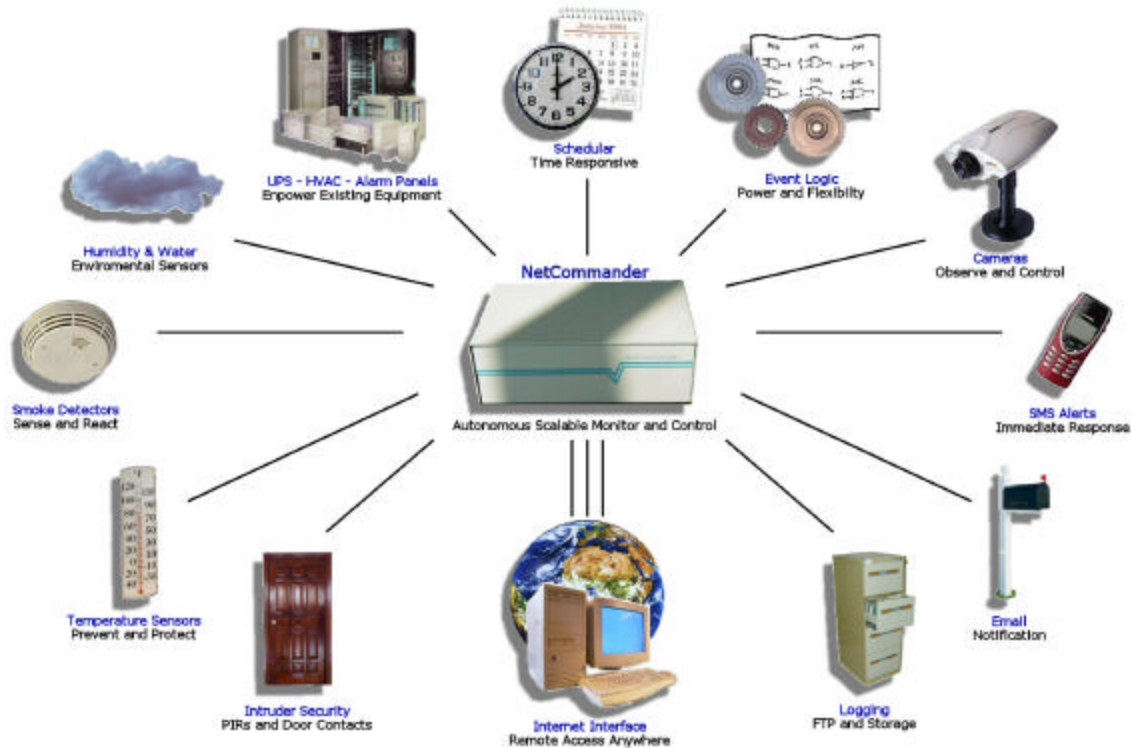


The NetCommander software utilises a powerful web based graphical user interface (GUI), which does away with the need for a PC based software element to the product. The graphical interface is served by NetCommander to provide remote encrypted access to the controller from any PC, from anywhere in the world. Users can access real time data and system status via a web browser, or choose to receive user defined alert messages via email and SMS mobile text.

With its scalable design and support for multiple simultaneous users, NetCommander provides the customer with the most complete web accessible standalone remote control solution on the market today.

## 2.0 NetCommander features

As standard NetCommander comes with a comprehensive list of features and an exciting list of future feature options to keep NetCommander up to date.



## 2.1 State of the art technology

NetCommander is a versatile standalone remote control that utilises a compact micro-controller. The Ethernet attached micro-controller hardware supports many IP protocols as well as analogue, digital and switched I/O. The flexible hardware architecture supports a number of plug and play interfaces that can provide up to 16 inputs. It also allows 'feature options' to be added to support GSM / GPRS / GPS applications, industrial I/O, and mains control. Multiple NetCommanders can be used together for those requiring a multi user or multi NetCommander solution.

## 2.2 Web based interface and core software

NetCommander combines a powerful web based GUI with highly flexible embedded core software. The web based GUI is served from NetCommander to the users local Java-enabled web browser. Java applets within the web page are executed to provide real time live data and system status. Logon passwords are secured using encryption preventing unauthorized access or interception.

At the heart of the flexible core software is an advanced event scheduler. It allows the user to manage the causes, the effects, the count of, and the states of up to 32 events and alarms from the various internal functions and external I/O devices. Logic operations can be performed on all events, further enhancing the scheduler flexibility. For important alarms, the user can choose to be alerted visually by an on screen alert message, by email or SMS text. All alarms alerts and events can be logged via the event logger, which time stamps and details each event log. A 365 day / time scheduler allows the user to trigger events, hourly, daily, weekly and monthly for up to a year in advance.





## 2.3 Standard NetCommander features

The following are supported as standard on the NetCommander product range.

- Standalone web based controller - No PC host software required
- Web based interface
- Ethernet Attached
- IP camera support
- Scalable solution - Master / Slave NetCommander
- Multiple simultaneous users
- Encrypted user login security
- Real time live status
- Advanced event scheduler - use of compound logic
- Remote terminal console sessions to attached serial devices
- Analogue / Digital / Switched I/O Interchangeable expansion interfaces
  - 4 port DIN or Screw terminal - 8 inputs, 4 switches, 4 outputs
  - 8 port DIN or Screw terminal 16 inputs, 8 switches, 8 outputs
- Date / time based scheduler for timed events
- Supports SNMP v2 (Optional upgrade)
- Serial device controller (Optional upgrade)
- Visual screen alert / Email / SMS mobile Text alarm notifications
- Supports SNTP time services
- Event logging
- Periodic FTP log upload
- Microsoft Excel compliant log format
- Multiple serial ports
- Wide range of sensors and devices supported
- Interface to existing UPS, HVAC systems, Security alarm functionality
- Flash storage of configuration information
- Firmware upgradable
- Surface mount technology
- Steel box construction for ruggedness and EMC protection

- UK based software/hardware design, support and repair

## 2.4 NetCommander sensors and devices

A wide range of sensors and devices can be interfaced to NetCommander providing the possibility of unlimited functionality.

- UPS / HVAC / security alarm monitoring
- Mains switching
- IP Camera
- Temperature sensors
- Relative humidity sensors
- Light sensors
- Dual tech / PIR intruder detectors
- Smoke, Heat and Carbon Monoxide sensors
- Liquid level sensors
- Flow sensors (air, liquid)
- Pressure sensors and switches
- Acoustic sensors
- Vibration sensors
- Glass break
- Water leak detectors
- Condensation detectors
- Pneumatic controllers
- Door contacts
- Switches (panic button, pressure mats etc.)
- Servo motors, water valves and window openers etc.)

## 2.5 NetCommander Network Management System (NMS)

The NetCommander NMS software allows the centralised monitoring of 100's of remote NetCommander's from one central management point. The server-based software allows individual NetCommanders to be organised into named groups and arranged in a hierarchical format. Alerts from individual NetCommanders can be processed and acted upon centrally. Two additional features allow the remote backup and restoration of individual NetCommander configurations.

## 2.6 Future feature options

The following list details the feature options that are currently under development or consideration by Cuberoot. The flexible expansion interface allows many possibilities, including bespoke solutions.

- **GSM/GPRS and GPS solution-** A GSM/GPRS module gives NetCommander access to the mobile world. A GPS module can be used to provide a tracking solution.

- **RFID Passive identification-** Applications requiring user identification, NetCommander can support a totally passive technology that utilises the Philips I.Code chip set. The unit can support read ranges of up to 0.6 m.
- **Industrial I/O-** For those industrial monitoring and control applications, NetCommander can support a wide range of interface specifications i.e. I<sup>2</sup>C, IrDA, SDLC / HDLC, Async and SPI bus.
- **X.10 Mains lighting and appliance control-** Wire free household lighting and appliance control using mains signaling.
- **Bespoke NetCommander solutions** - Talk to Cuberoot about your development requirements.

## 3.0 Getting started

Read the manual carefully, it is important that you follow the preparation and installation instructions closely. This will allow you to get the best out of the NetCommander product.

### 3.1 NetCommander Training and Support

Training and support for systems integrators and support organisations are available from Cuberoot, please contact Cuberoot or your local distributor for further details.

### 3.2 Equipment checklist

Please make sure that the following components are in the box. If anything is missing, please contact your dealer.

- NetCommander hardware
- 240v/12v mains adapter
- Selected sensors and devices

You will also require,

- The NetCommander serial cable (Order code X800-1012) terminated with 9 pin 'D type' connectors to configure NetCommander.
- Microsoft Windows 98 or above with Microsoft Hyperterm or Terminal applications
- For those who wish to use the SMS text functionality, CubeRoot has arranged preferential email to SMS text rates for NetCommander users with [www.sms2email.com](http://www.sms2email.com). Phone or e-mail sms2email quoting NetCommander to open your account.

For systems integrators and support organisations the NetCommander Field Utility (Order code A641-1011) is available for Firmware upgrades in the field. The kit comprises the following,

- NetCommander programming cable
- CD-ROM containing field programming software
- NetCommander field utility user manual
- Disposable anti-static wrist strap

### 3.3 Preparing for use

1. Check that all the necessary components listed in the equipment checklist section are present. NetCommander comes fully installed with all its software.
2. Ensure that your local PC has a suitable serial communication utility (Terminal, Hyperterm) and supported versions of Java and either Netscape Communicator or Microsoft Explorer installed. Microsoft Windows 98, 2000, XP, Red Hat Linux 9.0 are supported as long as they run the supported browsers and have a suitable serial utility. See the technical specifications for version requirements.
3. Connect NetCommander to the network using a standard Cat 5E 10baseT Ethernet cable. The point of network connection will depend on the configuration of your LAN and how you want to use NetCommander (internal/VPN or external)
4. Connect the serial communication cable between NetCommander's serial port and a spare serial port on the local PC, make a note of the PC serial port used (COM1, COM2 etc.). If you are not using a PC, then note the device port.
5. Start the Terminal/Hyperterm utility and set the following communications parameters.
  - Select COM 1 or COM 2 (Device port if non PC)
  - Data rate - 9600bps
  - Data bits - 8
  - Parity - none
  - Stop bits -1
  - Flow control - none

You are now ready to proceed with the NetCommander installation.

## 4.0 Installation

The following section describes the installation and basic set up for NetCommander.

Before you start the configuration session please have the following network parameters on hand.

- A valid internal or external static IP address e.g. 172.16.100.12
- A valid subnet mask e.g. 255.255.255.0
- Network default gateway e.g. 172.16.100.2
- SNTP time client IP address e.g. 172.16.100.22 (Optional)
- FTP Server account username and password (Optional)
- FTP Server IP address e.g. 172.16.100.25 (Optional)

## 4.1 NetCommander user and system defaults

On power up NetCommander loads the predefined user and system defaults. The System defaults provide the conversion factors for the supported analogue, alarm high and alarm low devices. The only user related defaults are for the logon passwords, which are left blank i.e. no password.

## 4.2 Network

Depending on how you wish to connect NetCommander to your network, you will have the option of using either valid or reserved / private network addresses. If you choose a private address, then this address is only valid within your private network and is not routed between real Internet sites, unless you intend to use VPN's across the public Internet. This private address range is specified in RFC 1597. If you wish to access NetCommander across the public Internet then you will require a valid IP address. In this situation NetCommander would be placed in your network demilitarized zone. You will need to contact your Internet Service Provider for a static IP address.

## 4.3 Simple Network Time Protocol (SNTP) service

SNTP is a simplified version of the Network Time Protocol (NTP) specified in RFC 1305. It is used to synchronize the time of client and server computers across a network and Internet. SNTP uses port 123. Typically firewalls are not configured to allow SNTP protocol messages. This prevents you from contacting or receiving messages from Internet timeservers. In order to use an Internet timeserver you will need to configure your firewall to allow IP/UDP outbound packets to port 123 and inbound IP/UDP packets from port 123. NetCommander can also be synchronised to local network devices running the NTP protocol such as dedicated timeservers and PC's running time server software.

**Note:** A full list public NTP (stratum 1/2) time servers is available at [www.ntp.org](http://www.ntp.org)

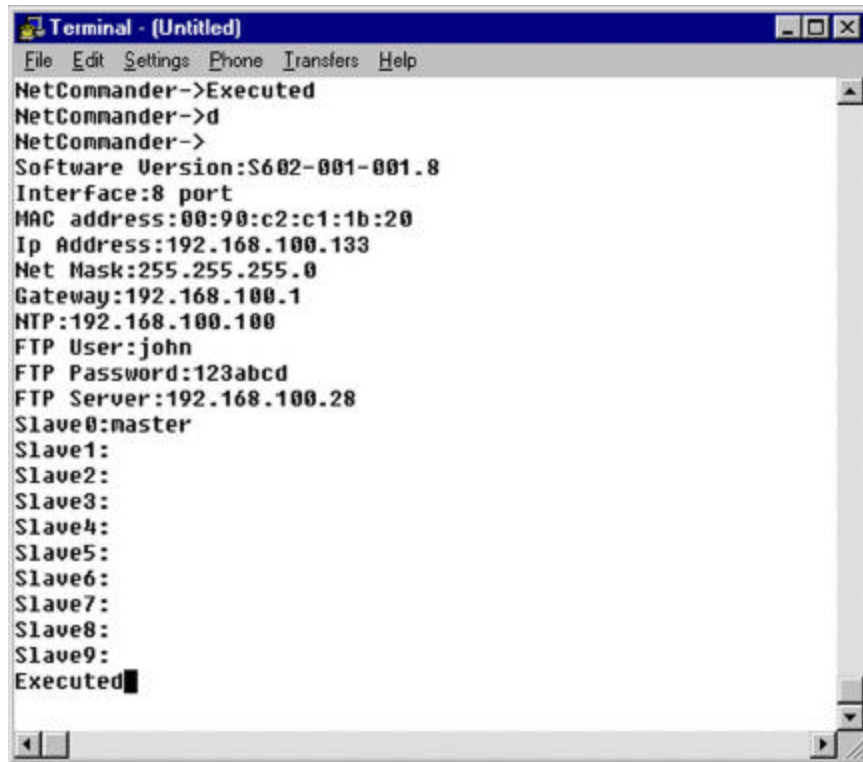
## 4.4 File Transfer Protocol (FTP) Service

The File Transfer Protocol is described in RFC 959. As its name implies, FTP allows local or remote client and server machines to share files and data using TCP's reliable transport protocol. The user (or client) uses an internally assigned port number to connect to server port number 21, designated for FTP control. The data to be transferred passes from another self assigned port on the user data transfer process to port 20 (designated FTP data) on the server data transfer process.

## 4.5 Initial NetCommander setup using a serial session

The following section details the basic installation of NetCommander. After completing this section the user should have full access to NetCommander via its web-based interface. This section assumes that the steps in the previous sections have been completed successfully.

1. Connect the Mains adapter and insert the power jack plug into NetCommander.
2. In Terminal / Hyperterm press <RETURN> within 5 seconds of powering up the NetCommander to set up a serial configuration session between the PC and NetCommander. The session is only available for 5 seconds after power-up. After this time the port defaults to the standard serial functionality.
3. If successful NetCommander returns the 'NetCommander->' command prompt to the serial utility. If unsuccessful repeat steps 1&2.



```
Terminal - (Untitled)
File Edit Settings Phone Transfers Help
NetCommander->Executed
NetCommander->d
NetCommander->
Software Version:S602-001-001.8
Interface:8 port
MAC address:00:90:c2:c1:1b:20
Ip Address:192.168.100.133
Net Mask:255.255.255.0
Gateway:192.168.100.1
NTP:192.168.100.100
FTP User:john
FTP Password:123abcd
FTP Server:192.168.100.28
Slave0:master
Slave1:
Slave2:
Slave3:
Slave4:
Slave5:
Slave6:
Slave7:
Slave8:
Slave9:
Executed
```

4. Only the IP, MASK and default GATEWAY parameters are mandatory, all others are optional. The optional parameters include the SNTP time service, FTP server access for logging and master / slave / node name functionality for environments using multiple NetCommanders and network cameras. All the parameters can be configured using the command line instruction set defined in Section 4.4.1.
5. To check the network connectivity to services such as FTP, SNTP and SMTP a ping facility is provided within the serial configuration session.
6. When all the required information has been added enter 'd' or 'detail' to double check what has been configured
7. When happy enter 'Quit or Exit' and press return to exit the NetCommander serial configuration session.

**Note:** You can always re-enter the serial session and change your configuration by power cycling NetCommander and pressing 'Enter' within 5 seconds.

8. Remove the NetCommander serial utility cable
9. Power cycle NetCommander by removing the power jack plug, waiting 10 seconds and then re-inserting it.
10. After a short delay the user should observe the Ethernet link light on (the LED is situated on the rear panel to the right hand side of the RJ45 socket). If this does not occur check that the unit has power and the Ethernet cable is terminated correctly. See fault finding section for further details.
11. Start browser and direct the browser to the following address  
http://<NetCommander IP address>/
12. If the interface is not displayed refer to the fault finding section.

**Note:** When updating settings with the serial utility always power cycle NetCommander. This will ensure that the new settings have been loaded into memory.

#### 4.5.1 Serial configuration Command Line instruction set

To Commit - Press 'RETURN' after any of the following commands  
On Success all commands will display 'EXECUTED' after completion. To clear individual parameters, enter the desired command instruction and leave the parameter field blank.

##### **IP<ip\_address>**

Description: - Sets the NetCommander IP address e.g. IP192.168.100.131  
<ip\_address>is an IP address in the dotted format

##### **MASK<mask>**

Description: - Sets the Network Mask  
e.g. MASK255.255.255.0  
<mask>is a network mask in the dotted format

##### **GATEWAY<ip\_address>**

Description: - Sets the NetCommander gateway address  
e.g. GATEWAY192.168.100.1  
<ip\_address>is an IP address in the dotted format

**NB.** Always power cycle after changing the gateway address.

##### **NTP<ip\_address>**

Description: - Sets the IP address of an SNTP timeserver. The timeserver is initially queried during the boot process. From then on the server is queried at 12am daily.  
e.g. NTP192.168.100.100  
<ip\_address>is an IP address in the dotted format

##### **FTPUSER<user\_name>**

Description: - Sets the user name for the ftp log output  
e.g. FTPUSERhjekyll

<user\_name> is a valid user name of an ftp server account

**FTPPASS<password>**

Description: - Sets the user name for the ftp log output

e.g. FTPPASSsecret123

<password> is a valid password of an ftp server account

**FTPSEVER<ip\_address>**

Description: - Sets the remote IP address of an ftp server,

e.g. FTPSEVER192.168.100.123

<ip\_address> is an IP address in the dotted format

**FTPDIR<directory\_path>**

Description: - Sets the remote directory path for the NetCommander ftp sessions,

e.g. FTPDIR\pub\netcommander

<directory\_path> is a valid directory location on the specified ftp server. Usage of / or \ in the directory path depends on the server operating system i.e. PC or UNIX.

**FTPMODE<PASSIVE / NONE>**

Description: - Sets ftp mode,

e.g. FTPMODEPASSIVE

<PASSIVE / NONE> are in capitols

**SLAVE<node\_number>IP<ip\_address>**

Description: - Sets a Slave Node on the master control page

To add slave number 6 with an IP address 192.168.100.10 you enter,  
SLAVE6IP192.168.100.10

<node\_number> is the number of the node to set 1-9

<ip\_address> is an IP address in the dotted format

**SLAVE<node\_number>NAME<name>**

Description: - Sets the name of a Slave Node on the master control page.

<node\_number> is the number of the node to set 1-9

<name> is the name of the Slave Node

**Note:** The Slave parameters allow a single NetCommander unit (the Master) to provide access to 9 other slave NetCommanders. Please note that the Masters name can only be set using the Settings - Node name functionality on the NetCommander web page, see section 4.5.

**PING<ip\_address>**

Description: - Performs a ping operation to an IP address, returns time if successful or Ping failed if not, e.g. PING192.168.100.123

<ip\_address> is an IP address in the dotted format.

**DETAIL (d)**

Description: - Lists the current serial configuration information for this NetCommander, the information includes the interface card type and software version.



## **CLEAR**

Description: - Clears all configuration information from flash memory. NetCommander will return an acknowledgement if the clear is successful.

**Important Note:** Using clear will clear all system and user configuration information in memory. Once cleared the configuration is unrecoverable. If 'CLEAR' is used it should be followed by 'INIT' to reload all the system default settings and then NetCommander should be power cycled.

## **INIT**

Description: - Initialises the NetCommander system default settings

**Note:** This should only be used following a firmware upgrade. NetCommander should then be power cycled so that the system default settings take effect.

## **QUIT or EXIT**

Description: - Terminates the interface.

## **4.6 Setting up NetCommander's Web defaults**

The following section details the setup procedure to be carried out via the NetCommander web interface. This can be done from any platform e.g. PC, MAC, UNIX etc. that can run a supported Internet browser.

Start browser and direct the browser to the IP address of NetCommander. If the interface is not displayed refer to the fault-finding section.

***http://<NetCommander IP Address>/***

If a number of slaves have been configured i.e. using the serial utility, this NetCommander now becomes the master. Master NetCommander's can support up to nine NetCommander slaves or other compatible IP devices i.e. IP cameras. To use the master page functionality '/master' should be appended to the URL of the device as below. The master page lists the slave nodes in a column on the left-hand side of the web page.

***http://<NetCommander IP Address>/master***

When the 'Home' page has loaded, a dialogue box can be seen requesting a password. To open the NetCommander interface you must first login through this home page. Until you are logged in all other pages will be unavailable and will only present an advisory message.

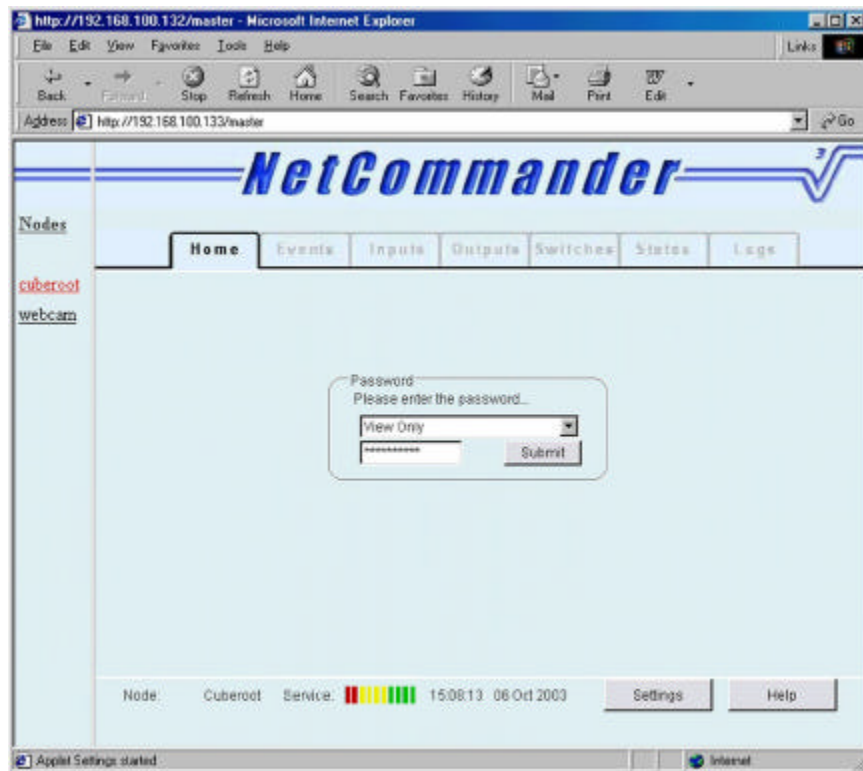
To login, ensure you are on the home page - this may be done by clicking the 'Home' tab. You are requested to enter a password and you have the choice of two levels of access, each with it's own password.

- **View Only** - In view only mode you will have access to all the information collected by NetCommander but will not be able to alter any of the settings.

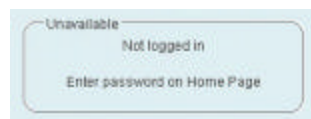
- **Full Access** - In full access mode you will have access to all the information and be able to alter any of the settings.

Select your required access level and enter the associated password.

**Note:** When logging in for the first time the password field should be left blank as NetCommander is shipped with no password (See 'Settings, Password' to alter passwords).



If you enter an invalid password you will be advised to try again. Please note that the passwords are case sensitive, so capital letters must be used correctly. The following error message will be displayed if the user attempts to navigate the interface without first logging in.

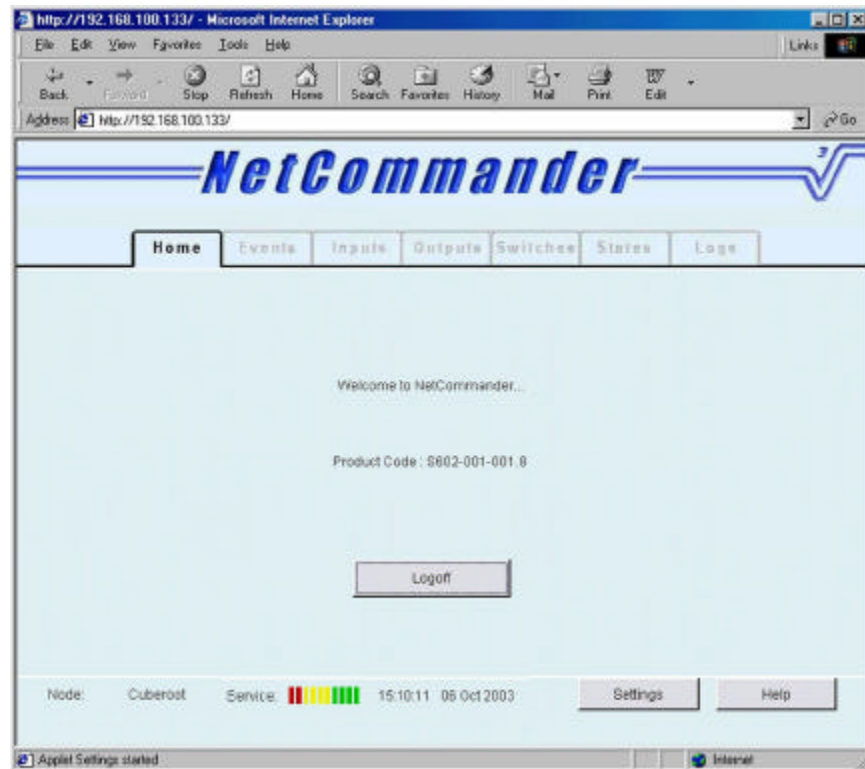


Once the password has been verified, the configuration information will be loaded from NetCommander and the user will be presented with the NetCommander welcome page. The page details the part number and provides access to NetCommander's functions as well as providing a log off facility. Node name, time and a service indicator are also displayed on the page.

For security reasons, an inactivity timer has been implemented which will log the user out of NetCommander if the interface is inactive for more than 30 seconds. This will only be activated if the user browses another site or if there is a network outage

for more than 30 seconds. A Network service indicator bar graph, graduated in 3 second intervals, indicates the delay experienced by the protocol messages in the network. Network delays of 30 seconds or more will result in an offline message.

**Note:** Help is available for each I/O function via the help button in the bottom right hand corner of each page.

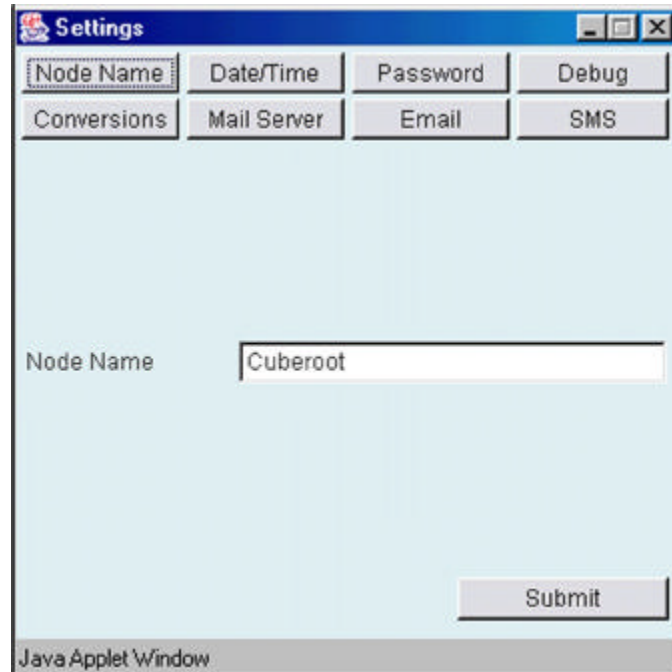


To set the remaining NetCommander parameters, click on the 'settings' dialogue button in the bottom right hand corner of the welcome page. NetCommander will serve the settings configuration page in a new window. The settings page provides access to a number of configuration functions that allow the configuration of Node name, Date/Time, Password, Debug, conversion factors, mail server, email and SMS parameters.

To set the node name select the node name button in settings and enter the required node name. If this is the master NetCommander and the node name has been set, this is the name that will be used in the master page to indicate the master. If the node name is not set, the default name 'Master' will be used in the master page. To set the date and time the user has a number of options. The preferred option is to use the SNTP timeserver functionality supported by NetCommander. This can be configured using the serial configuration utility mentioned earlier in this manual. If configured, SNTP will access the desired timeserver on power up and from then on automatically every 24 hours at 12.00 midnight. Using a single SNTP time source allows NetCommander to be synchronised with local network equipment.

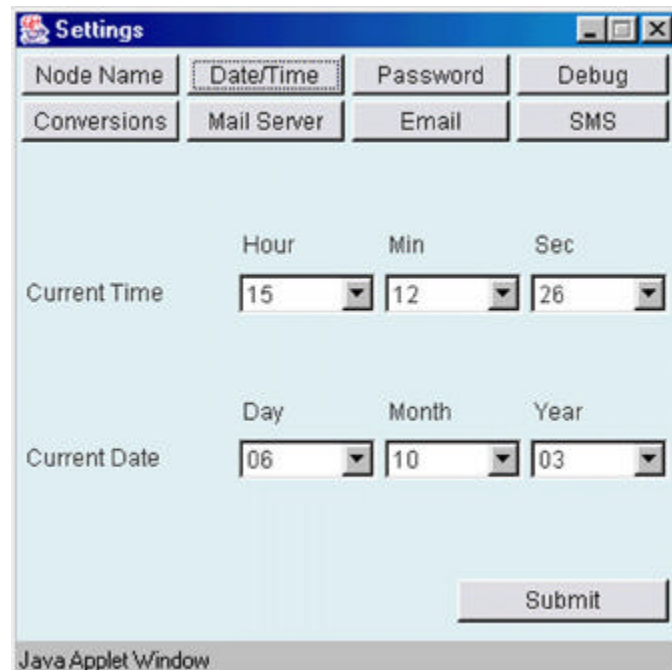
Alternatively, the user can select the 'Date/Time' button and configure the current time and date using the pull down menus. The date and time will then be maintained

by NetCommander's real time clock. The clock is not battery backed and therefore any power failure will result in the time being reset to zero. In most operational environments NetCommander should be connected to the UPS system, if available.



The screenshot shows the 'Settings' window with the 'Node Name' tab selected. The window has a blue title bar with the text 'Settings' and standard window controls. Below the title bar is a grid of tabs: 'Node Name', 'Date/Time', 'Password', 'Debug', 'Conversions', 'Mail Server', 'Email', and 'SMS'. The 'Node Name' tab is active, showing a text input field with the value 'Cuberoor'. A 'Submit' button is located at the bottom right of the main content area. The bottom of the window has a grey bar with the text 'Java Applet Window'.

**Please note:** British Summer Time (BST) daylight saving and other local time adjustments are not supported on NetCommander. If BST or local time is not available via your NTP server, this service should be disabled. Under these circumstances the time should be manually configured using the 'Date/Time' setting window and set to the appropriate time.



The screenshot shows the 'Settings' window with the 'Date/Time' tab selected. The window has a blue title bar with the text 'Settings' and standard window controls. Below the title bar is a grid of tabs: 'Node Name', 'Date/Time', 'Password', 'Debug', 'Conversions', 'Mail Server', 'Email', and 'SMS'. The 'Date/Time' tab is active, showing fields for 'Current Time' and 'Current Date'. The 'Current Time' field has three dropdown menus for 'Hour' (15), 'Min' (12), and 'Sec' (26). The 'Current Date' field has three dropdown menus for 'Day' (06), 'Month' (10), and 'Year' (03). A 'Submit' button is located at the bottom right of the main content area. The bottom of the window has a grey bar with the text 'Java Applet Window'.

NetCommander's default password can be changed using the password setting window. NetCommander is shipped with no password, but this may be altered here. It is strongly recommended that the password be changed from the default value, as this will insure continued logon security.

You are given the option to alter the three levels of password.

- **View Only** - The view only mode password, used for normal access.
- **Full Access** - The full access mode password, used for altering the system configuration.
- **Network Management System** - A special password used by the optional NetCommander Network management system (NMS) application.

Passwords must be up to 10 characters long and should contain a mix of numbers and letters.

In order to confirm your authority to change the password you are requested to enter the current password. When changing the password for the first time, the old password field should be left blank. You are required to enter the new password twice, the second time is used to confirm that you have entered it consistently to help prevent typing errors.

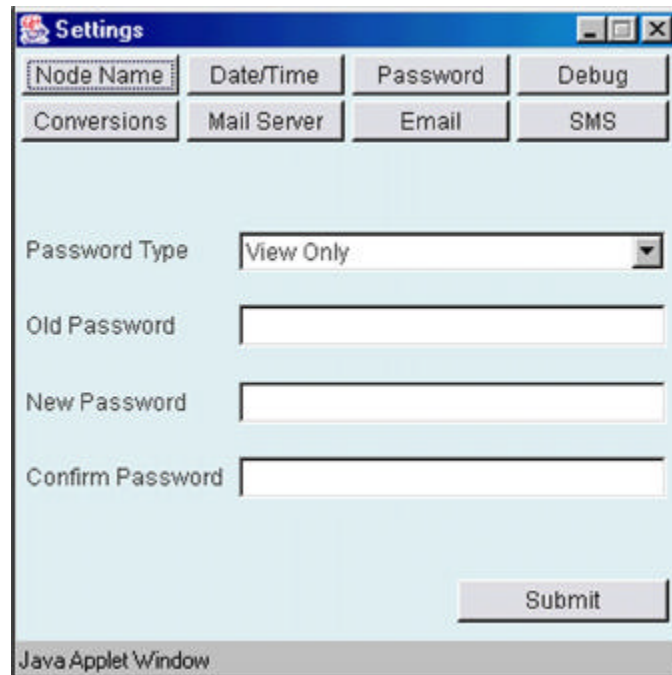
Please ensure that you alter passwords carefully and keep in mind that the passwords are case sensitive so capital letters must be used consistently. Once the submit button is clicked you will be informed whether the password change was successful.

It is advised that you maintain different View Only and Full Access passwords and only provide the Full Access password to users with the appropriate authorised access.

The NetCommander NMS password should be changed to the same as that configured on the NetCommander Network management system to allow it access. If this NetCommander is not to be connected to a central system application then it is recommended that you change the NMS password from its default and record this change securely.

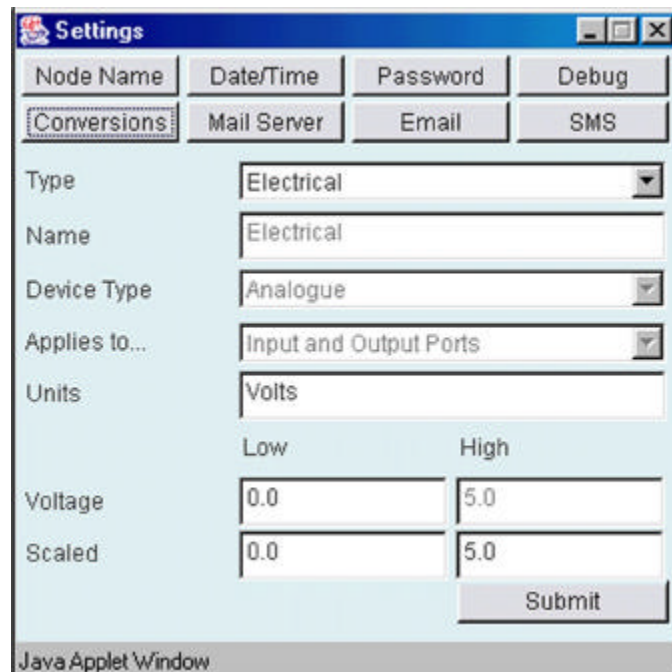
**Warning:** If a password is lost, then the only method to reset the password is to reset the entire system, this will result in the complete loss of all configuration.

NetCommander also provides a debug capability to assist systems integrators and support organisations in debugging and reporting faults. This functionality can be turned on by entering the engineer's code. This is available via the 'Debug' button in 'Settings'.



The screenshot shows the 'Settings' window with the 'Password' tab selected. The window has a title bar with standard OS controls. Below the title bar is a tabbed interface with tabs for 'Node Name', 'Date/Time', 'Password', 'Debug', 'Conversions', 'Mail Server', 'Email', and 'SMS'. The 'Password' tab is active, displaying a 'Password Type' dropdown menu set to 'View Only', and three text input fields for 'Old Password', 'New Password', and 'Confirm Password'. A 'Submit' button is located at the bottom right of the form area. The status bar at the bottom indicates 'Java Applet Window'.

A range of standard devices and sensors come ready supported by the NetCommander conversion functions. For OEM equipment, the conversion utility provides a means of scaling the input and output voltages of temperature and humidity sensors and alarm high and low devices to the correct units. The function also provides and 'UNUSED' type, this can be user defined and scaled to support pressure, flow etc. sensors.



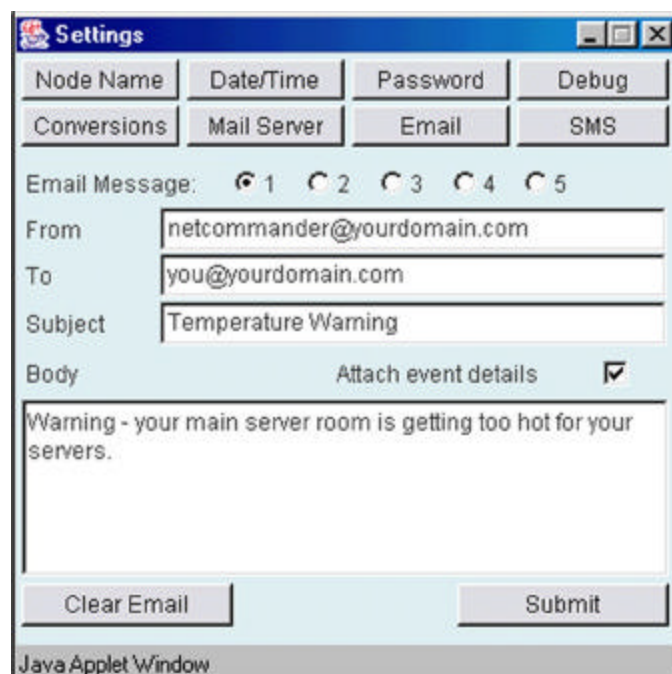
The screenshot shows the 'Settings' window with the 'Conversions' tab selected. The window has the same tabbed interface as the previous image. The 'Conversions' tab is active, displaying a 'Type' dropdown menu set to 'Electrical', a 'Name' text field with 'Electrical', a 'Device Type' dropdown menu set to 'Analogue', and an 'Applies to...' dropdown menu set to 'Input and Output Ports'. Below these are 'Units' set to 'Volts', and two columns of input fields for 'Voltage' and 'Scaled' values, both with 'Low' and 'High' settings. The 'Low' values are all set to '0.0' and the 'High' values are all set to '5.0'. A 'Submit' button is located at the bottom right of the form area. The status bar at the bottom indicates 'Java Applet Window'.

If e-mail and SMS text services are required, it will be necessary to fill in the SMTP mail server IP address.



The screenshot shows a Java Applet Window titled "Settings". It has a tabbed interface with tabs for "Node Name", "Date/Time", "Password", "Debug", "Conversions", "Mail Server" (which is selected), "Email", and "SMS". The "Mail Server" tab contains a text field labeled "SMTP Mail Server" with the value "172.16.100.11" entered. A "Submit" button is located at the bottom right of the window.

NetCommander supports up to 5 separate email events. The events are numbered at the top of the window. Simply click on the email number you wish to configure or edit. The email number selected is indicated by a black spot next to the number. To specify an e-mail recipient, who will receive NetCommander email alerts, fill in the 'To' (recipient email address), the 'From' (NetCommander email address) and the subject and body text sections for the email event.

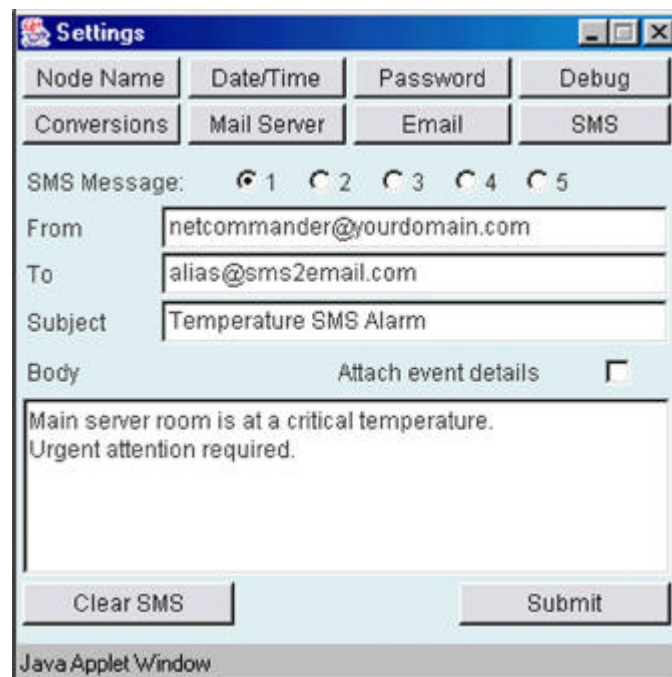


The screenshot shows the "Email" tab in the "Settings" window. It features a section titled "Email Message:" with five radio buttons labeled "1" through "5". Radio button "1" is selected. Below this are text fields for "From" (containing "netcommander@yourdomain.com"), "To" (containing "you@yourdomain.com"), and "Subject" (containing "Temperature Warning"). There is a "Body" section with a text area containing "Warning - your main server room is getting too hot for your servers." and a checkbox labeled "Attach event details" which is checked. At the bottom, there are "Clear Email" and "Submit" buttons.

The recipient, subject text and body text should reflect the expected conditions that will trigger this email i.e. a temperature event might require an email subject text something like 'Temperature Alert 30°C'.

**Note:** NetCommander only supports a single recipient per email message, comma separated recipient lists are not supported.

NetCommander also supports up to 5 separate SMS mobile text events. In the 'To' field Fill in the alias of the person to be notified by SMS text in the event of a predefined alert. All other fields are as email settings. If the SMS functionality is not required, the SMS messages can be used as an additional 5 email messages.



To support SMS mobile text, you will need to set up an email to SMS service with an email to SMS text Internet service providers.

**Note:** CubeRoot has arranged an email to SMS service for NetCommander with [www.sms2email.com](http://www.sms2email.com). It is also possible to re-brand sms2email's gateway to your or a customers SMS domain i.e. 'yourcompanySMS.com' and forward emails from this account to sms2email's gateway. Phone or e-mail Cuberoot for details of this service.

Restart your browser application and enter your new password when requested. NetCommander is now ready for use.

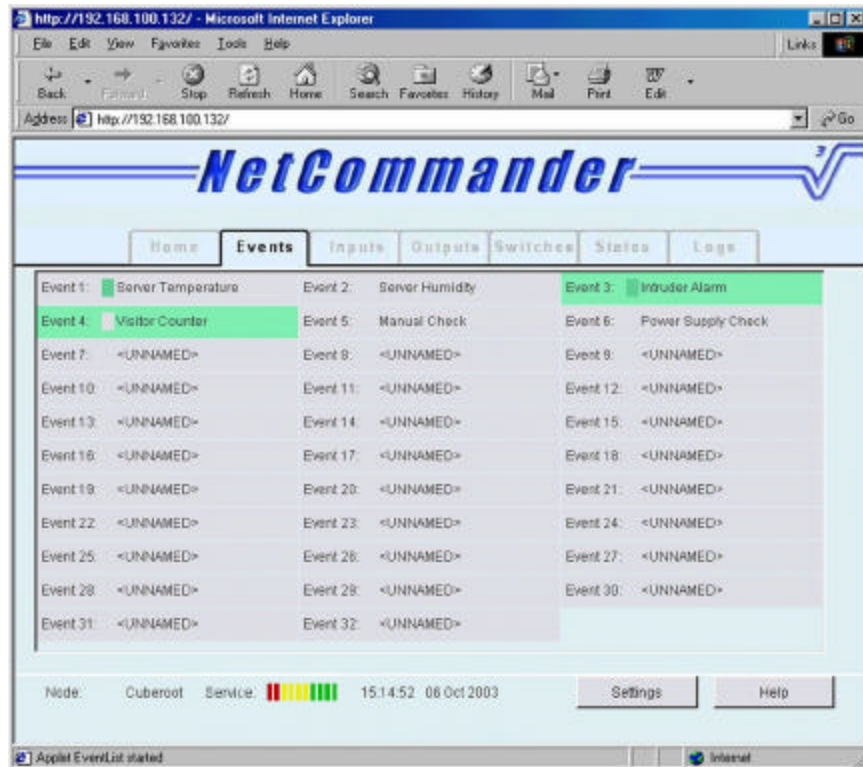
## 5.0 Navigating the NetCommander interface

This section is intended to familiarize the new user with the features of the NetCommander interface. Access to the different function windows is by way of the tabs near the top of the page. The tabs allow the user to navigate to the Events, Inputs, Outputs, Switches, States and Logs sections of the interface.



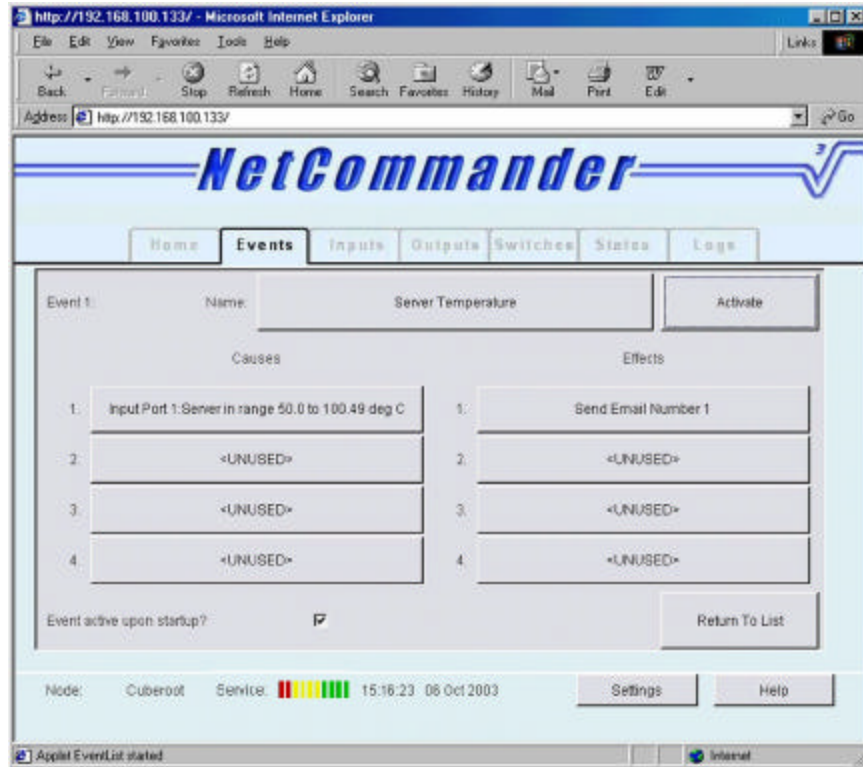
## 5.1 Events

Working from left to right the first tab after 'Home' selects the 'Events' summary window.



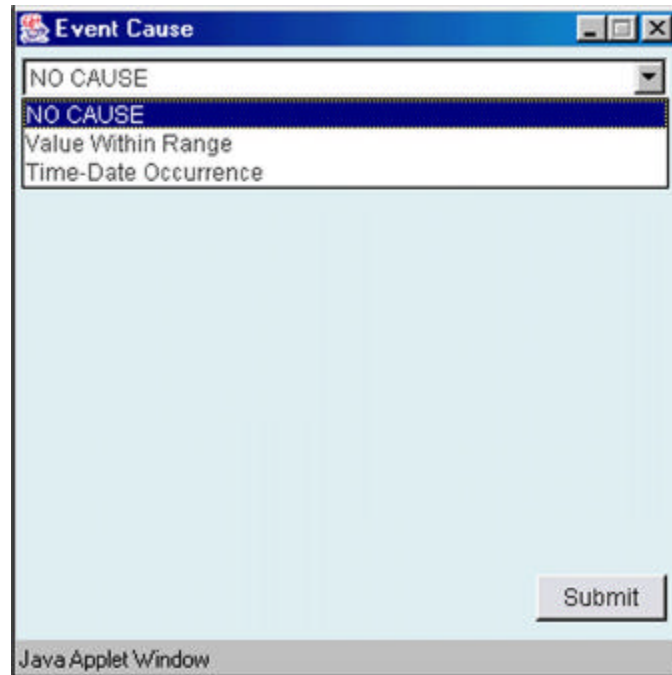
The advanced event scheduler allows the user to manage the causes and effects of up to 32 events. A NetCommander input device, such as a temperature sensor, can typically be used in one of two ways. The first is as a simple temperature monitor. In this scenario, the NetCommander interface simply provides a visual indication of temperature to the user. The second and more complex scenario would be to couple the input device to an event. Using the cause and effects fields of an event, an input value or state can be made to trigger an effect, such as an email, or even another event. Configuring a number of causes and effects or triggering a number of events for a single event / input provides logical AND / OR functionality respectively. The advanced event scheduler gives NetCommander great flexibility and power, but is complex to use. Sample configurations using the event scheduling functionality can be found in the next section of this manual.

The 'Events' tab window lists all the events, used or unused, supported by NetCommander. Initially, there will be no user configuration in the unit, the numbered event windows will therefore be blank. Clicking on a particular numbered event takes the user to the configuration window for that particular event. Within this window, the user is presented with a number of fields requiring user input.

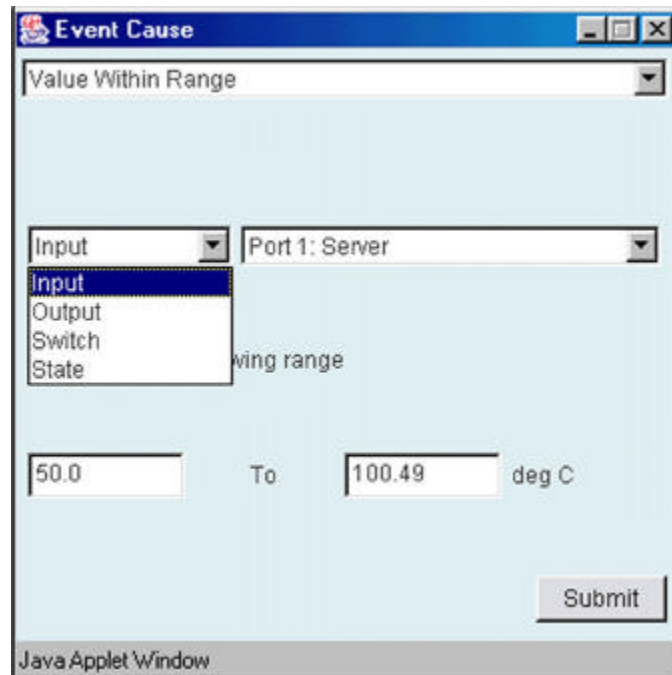


- The 'Name' field allows the user to name the event, this will be the name that appears with the event number in the event summary window.
- The 'Causes' fields provide the user with a number of event trigger options.
- The 'Effects' fields provide the user with a number of event effect options.
- The 'Event activate upon startup' check box allows the user to configure this event to be activated by default if ever the NetCommander is re-started. When this is selected, it is indicated in the event summary window by a small green box next to the event name text.
- The 'Activate' button activates the event and indicates this by turning the whole event dialogue window green. In this state, a valid cause condition will trigger any configured effects.
- The 'Return To List' button takes the user back to the events summary window.

Clicking on one of the four available 'Cause' fields for this event opens the 'Event Cause' window this allows the user to select a 'Value Within Range', a 'Time-Date Occurrence' cause or the default condition 'NO CAUSE'.



Selecting a 'Value Within Range' cause, allows the user to choose from a range of Input, Output, Switch, and State ranges or conditions. The adjacent dialogue box lists the valid field entries for each selection i.e. for inputs this would be all the input ports on the interface card. The third of the three dialogue boxes provides the associated activation condition for the event



Alternatively, selecting a 'Time-Date Occurrence' allows the user to select either a 'Time Passed' condition i.e. a specific time and date, or a 'Delay Passed' i.e. a specific delay interval, to be the trigger cause.

Event Cause

Time-Date Occurrence

Type: Time Passed (selected), Delay Passed

Time: Hour (15), Min (17), Sec (25)

Date: Day (06), Month (10), Year (03)

Submit

Java Applet Window

The 'Submit' button submits the configuration to memory and closes the window. Clicking on one of the four available 'Effects' fields from the event configuration window opens the 'Event Effects' window. The 'Event Effects' window provides the user with a number of event effect options as indicated below.

Event Effect

NO EFFECT (selected)

Alert

Set Port/State Value

Counter Increment/Decrement

Send Email

Send SMS

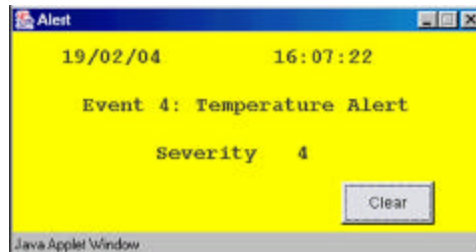
Activate/Deactivate Event

Activate Logging

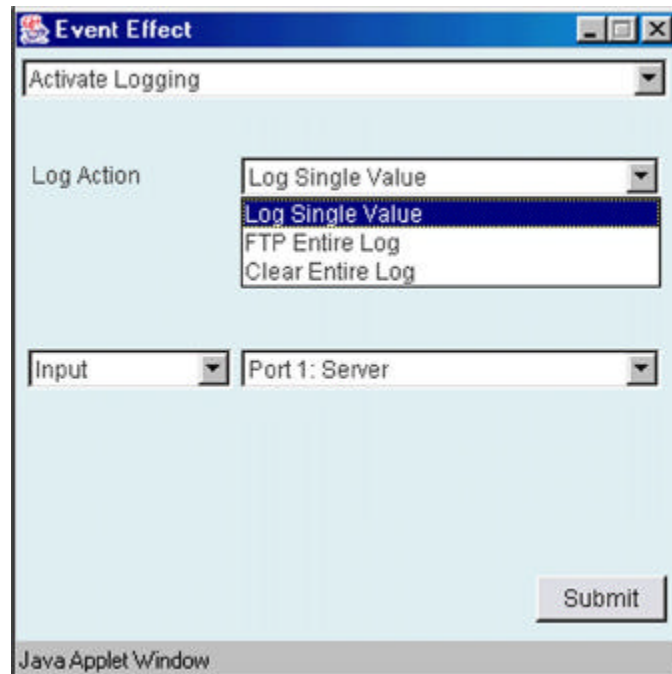
Submit

Java Applet Window

Clicking on one of the available effects, links the user to a further window from which the selected effect condition can be configured. This allows the event scheduler to set the states or values of outputs, switches, counters, activate / deactivate events, send emails, start logging or display an on screen visual alert. By selecting 'Alert' as an effect, the user will be presented with a flashing dialogue window, as below, with the details of the event that has been triggered.



An example of the 'Event Effect' window for logging is shown below.

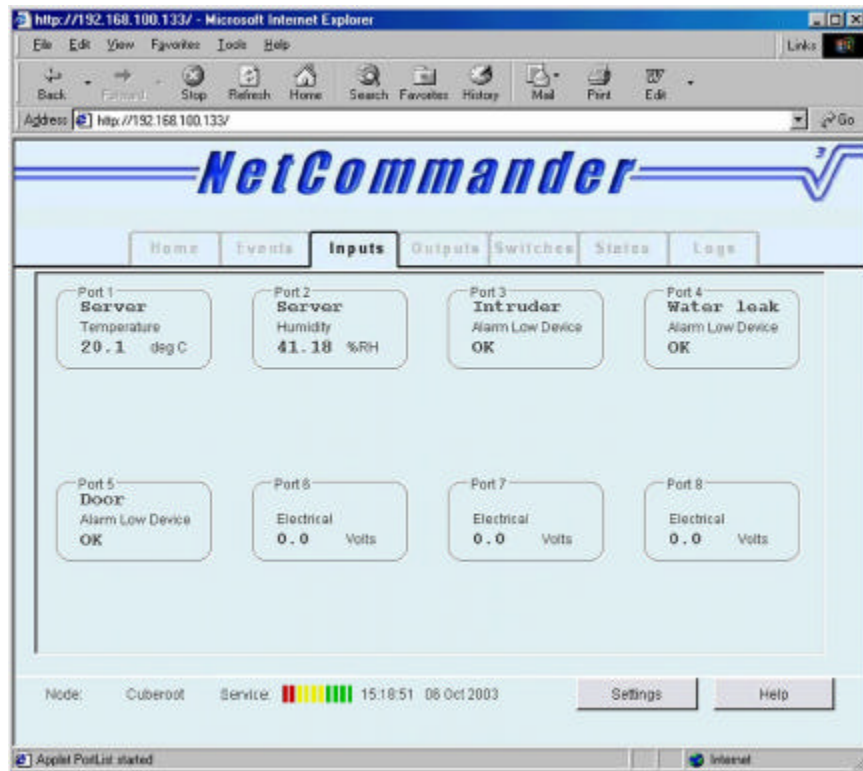


Submitting the selection stores the effect information in to flash memory and links the selected effects to the causes for this event. Activation of this event is a simple case of selecting the 'Activate' button in the event configuration window.

## 5.2 Inputs

The Inputs summary window can be accessed via the 'Inputs' tab. This window details all the input ports available on the NetCommander unit. The number of inputs displayed in this window is dependent upon the type and model of interface fitted to the NetCommander. Netcommander's plug and play functionality identifies the interface at power up and updates the number of inputs, outputs and switched I/O ports accordingly. The standard input types supported by NetCommander are

electrical (Volts), Temperature (Degrees), Relative Humidity (%) and Alarm high/low functionality (OK, Alarm) to support PIR's and smoke detectors etc.

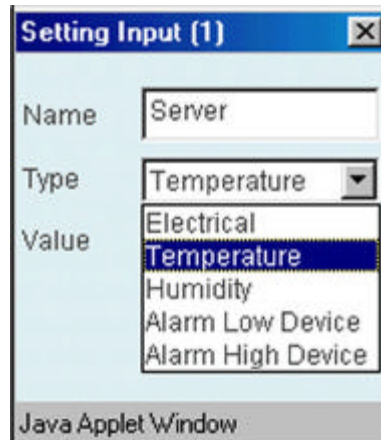


Clicking on any one of the port information windows opens the 'Settings Input' window. This allows the user configure a number of port parameters for that port.

- The 'Name' field allows the user to name the input port, a maximum of 10 characters is allowed.
- The 'Type' field lists the types of input supported by NetCommander.
  - Electrical - A device providing an input voltage (0-5v) that does not require scaling or conversion, port window will indicate an electrical voltage.
  - Temperature - The default temperature sensor providing an electrical input voltage (0-5v) that is scaled and converted to temperature, port window will indicate a temperature in degrees Centigrade
  - Humidity - The default Humidity (RH) sensor providing an electrical input voltage (0-5v) that is scaled and converted to RH, port window will indicate humidity in %RH
  - Alarm Low Device - Any device providing a N/C relay contact as an alarm. An alarm condition will be produced when the contact is open. Port window indicates OK or Alarm.
  - Alarm High Device - Any device providing a N/O relay contact as an alarm. An alarm condition will be produced when the contact is closed. Port window indicates OK or Alarm.

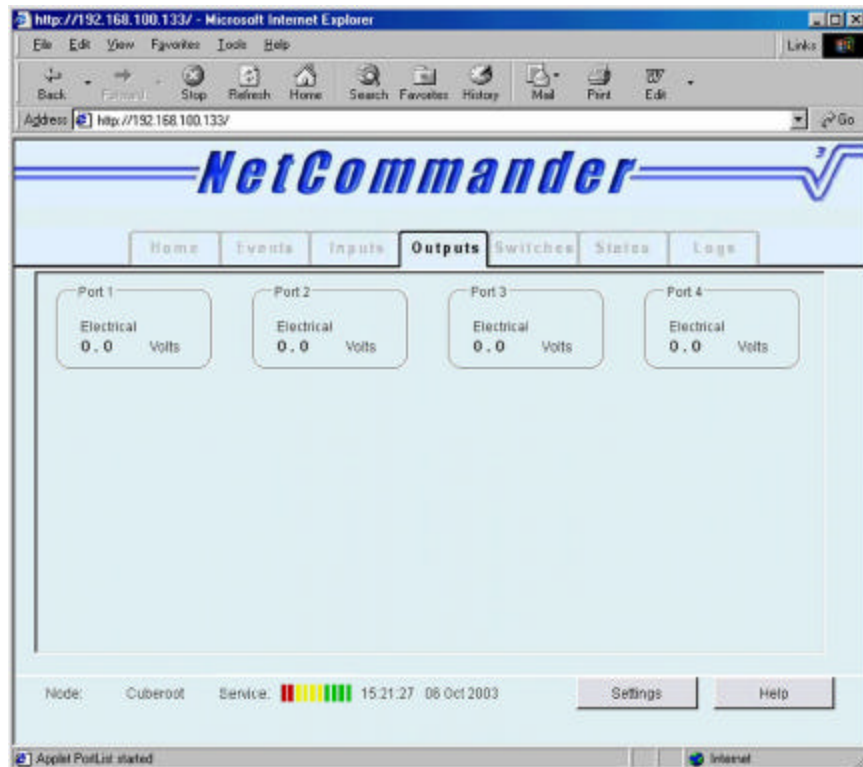


- If defined in 'conversions' an additional user defined input type will be available, this can support input devices such as pressure, acoustic and chemical sensors etc.
- The 'Value' field provides the user with the current electrical input value or alarm state for this port.



## 5.3 Outputs

The Outputs summary window can be accessed via the 'Outputs' tab. The window details all the output ports available on the NetCommander unit.

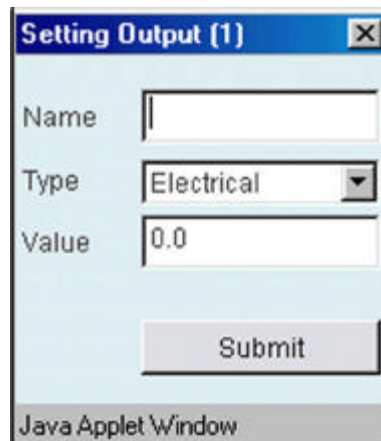


The number of outputs displayed in this window is dependent upon the type and model of interface fitted to the NetCommander.

Clicking on any one of the port information windows opens the 'Settings Output' window. This allows the user configure a number of port parameters for that output port.

- The 'Name' field allows the user to name the output port, a maximum of 10 characters is allowed.
- The 'Type' field lists the types of output supported by NetCommander.
  - Electrical - An Electrical voltage is the only output type currently supported.

The 'Value' field allows the user to set electrical output value between 0 - 5 Volts for this port.



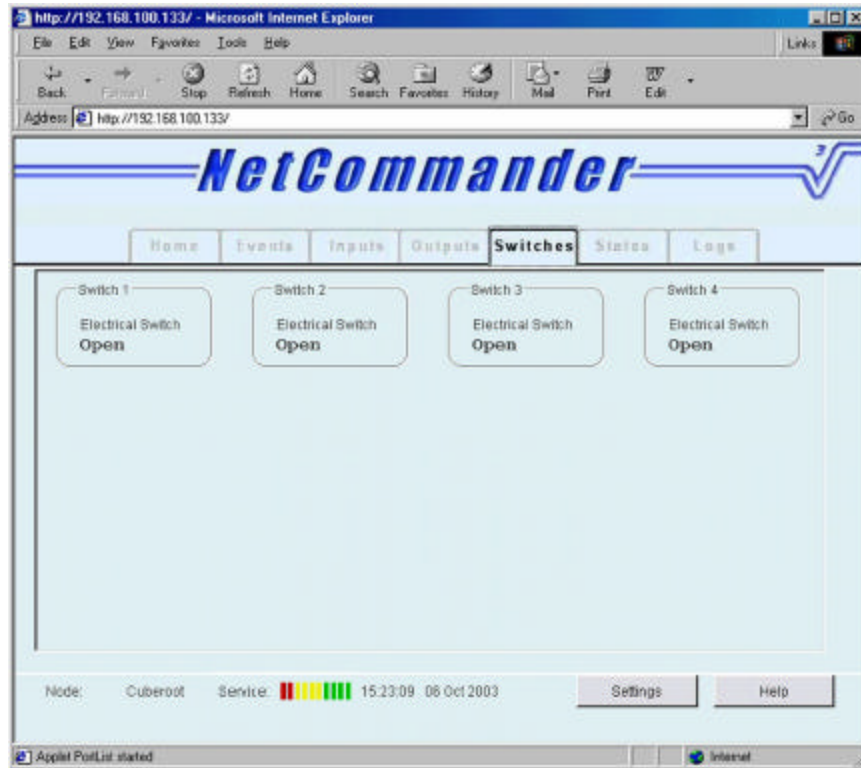
Clicking on 'Submit' sets the selected output port information to the desired name, type and sets the output port to the desired value.

## 5.4 Switches

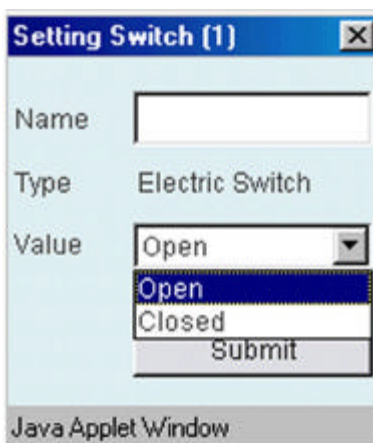
The 'Switches' summary window can be accessed via the 'Switches' tab. This window details all the switch ports available on the NetCommander unit. The number of switches displayed in this window is dependent upon the type and model of interface fitted to the NetCommander.

Clicking on any one of the switch information windows opens the 'Settings Switch' window. This allows the user configure the switch parameters for that switch port.





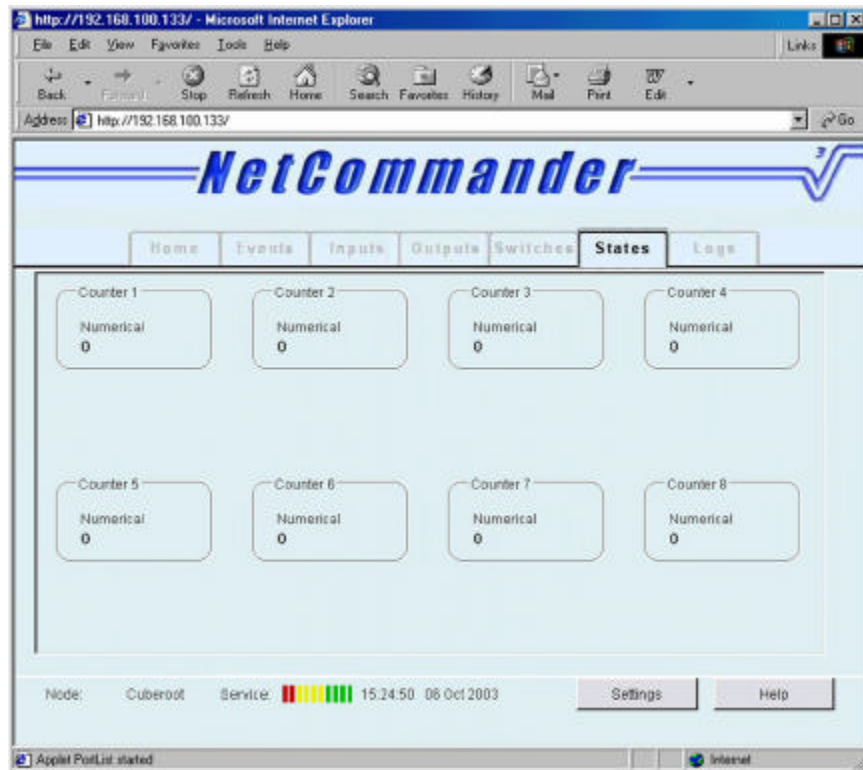
- The 'Name' field allows the user to name the switch, a maximum of 10 characters is allowed.
- The 'Type' field - By default is set to 'Electric Switch'
- The 'Value' field allows the user to set the current switch state (Open or Closed) for this port.



Clicking on 'Submit' sets the selected switch port information window to the desired name, type and state.

## 5.5 States

The 'States' summary window can be accessed via the 'States' tab. This window details all the internal counters available on the NetCommander unit. As the counter functionality is an internal function of NetCommander, the number is not dependent on the type of interface fitted. By default the number of internal counters has been limited to 8.

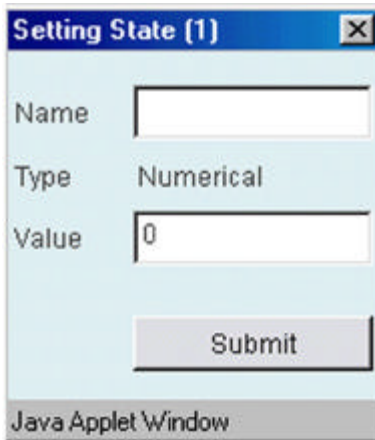


Clicking on any one of the State information windows opens the 'Settings State' window. This allows the user to configure the counter parameters for that counter port.

- The 'Name' field allows the user to name the counter, a maximum of 10 characters is allowed.
- The 'Type' field - By default set to 'Numerical'
- The 'Value' field allows the user to set the counter value for this port.

Clicking on 'Submit' sets the selected counter port information to the desired name and state.

**Important note:** Outputs, Switches and state values are not maintained in the event of a loss of power, unless their value has been set by an event that is activated on power up.

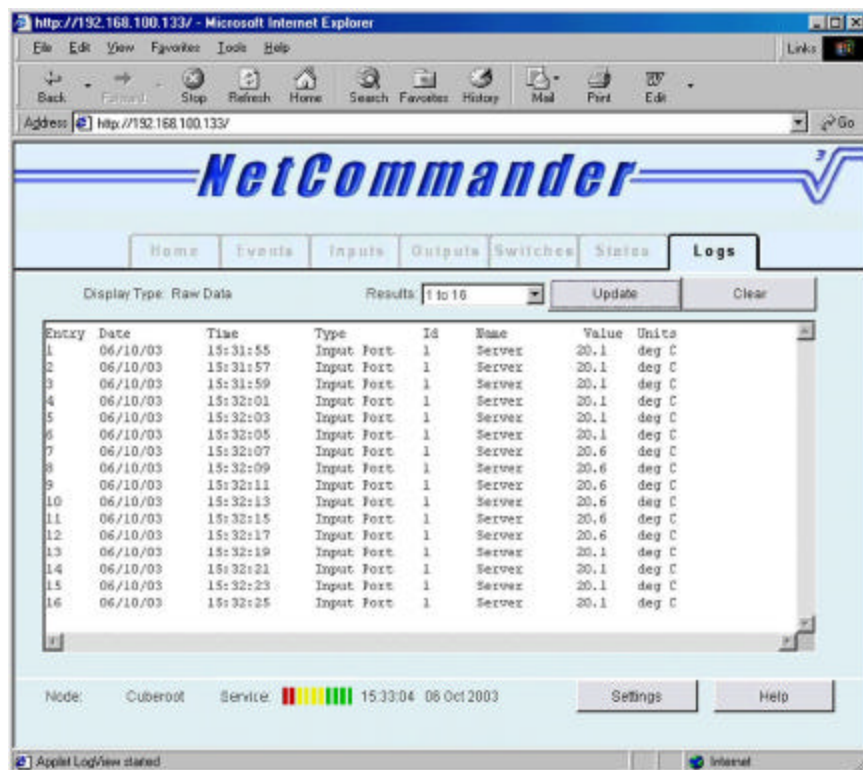


A Java Applet Window titled "Setting State (1)". It contains three input fields: "Name" (empty), "Type" (set to "Numerical"), and "Value" (set to "0"). Below these fields is a "Submit" button. The window has a standard Windows-style title bar with a close button (X) and a status bar at the bottom that reads "Java Applet Window".

## 5.6 Logs

The 'logs' summary window can be accessed via the 'Logs' tab. This window provides details of all the logs generated by the NetCommander unit. Logs are displayed in the logging window in batches of 50. The 'Results' pull down menu provides access to the rest of the logs, also grouped in batches of 50.

- The 'Update' button updates the logs in memory to the screen
- The 'Clear' button clears all the log entries in memory and on the screen. Conformation of the 'Clear' instruction is requested before the log entries are deleted.



**Note:** The 'Update' button must be pressed to ensure the latest up to date log information is collected from the NetCommander.

## 6.0 Connecting interfaces, sensors and devices

The following section describes the NetCommander interface variants and their connection to Cuberoot approved sensors and devices. There are two different interface types available, the screw terminal and the 9-pin mini-DIN type. Each interface type is available in either a 4 or 8 port configuration; each has plug and play functionality. The plug and play functionality means that NetCommander can automatically detect the type of interface fitted and update the web interface as required.

The interface electronics are the same for both the screw terminal and Mini-DIN versions. It briefly comprises of protection chips for all connections to prevent injurious voltages damaging the chips. The input and output chips are very high sensitivity 10bit Digital to Analogue and Analogue to Digital converters respectively. The switches are provided using an Octal SPST analogue switch. These are all controlled from the internal SPI bus that is driven by the microprocessor. The interface card also provides +12 volts to drive sensors, and +5 volts to form the loop voltage for relay contacts. These voltage outputs are protected by re-settable fuses, which if the rails are shorted to ground will go to a high resistance state, but will return to normal state when the short circuit is removed.

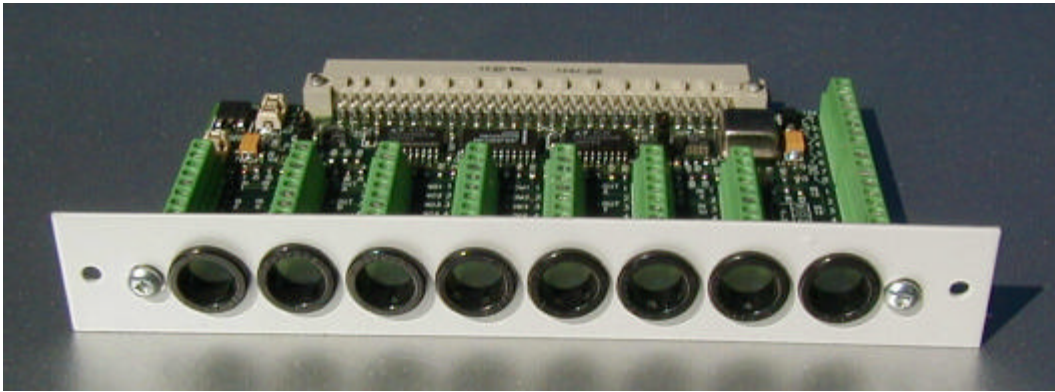
The screw terminal interfaces are aimed at the expert installer, who is familiar with the NetCommander hardware and who has completed an approved NetCommander course. Mini-DIN interfaces are aimed at the installer with no NetCommander hardware experience but who is familiar with the wiring up of security alarm products.

To connect the sensors to the NetCommander, two approved cabling formats have been specified. For screw terminal interfaces, installers should use the specified cabling, cut and terminate as specified by the wiring diagram supplied with each sensor. For mini-DIN interface users, cables of 10, 20 and 30 meters long, terminated at one end with a 9-pin mini-DIN plug are available. The latter cabling format substantially reduces the possibility of wiring errors and improves the speed and maintainability of the installation.

**Important Note:** When removing or replacing interface cards, NetCommander must be powered down first. Failure to do this may result in damage to both the motherboard and interface card.

### 6.1 Screw terminal interfaces

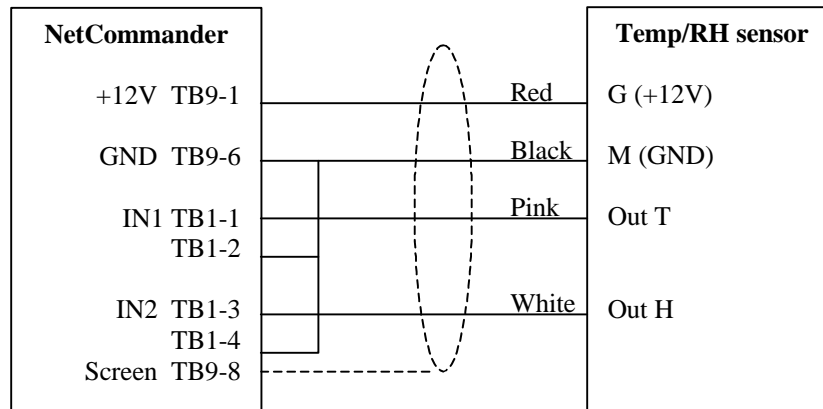
The screw terminal interfaces offer the expert installer a flexible method of connecting sensors to NetCommander. Sensors are wired to NetCommander in a similar way to that for conventional security alarm systems. A pinout and description of each terminal for the screw terminal interface can be found in Chapter 9 of this manual.



1. Before proceeding with the installation of any NetCommander sensors ensure that static precautions have been taken. This will prevent static discharges to any sensitive electronic components.
2. When planning the installation, NetCommander should be positioned such that the maximum cable length to any sensor is not greater than 30-35 meters. Distances greater than this may result in unacceptable voltage drops and take supply, loop and signaling voltages outside specification.
3. Remove the power connector from the back of NetCommander.
4. Remove NetCommander's interface card by removing the outer most pair of the four screws located on the interface fascia. Take hold of both withdrawal posts on the interface card and pull whilst exerting a force on the back panel of NetCommander. The interface card should then pull clear of the box. Please remember to take static precautions.
5. Position sensors and run wiring as required. Cable access for the terminal blocks is through the purpose made holes in the interface fascia.

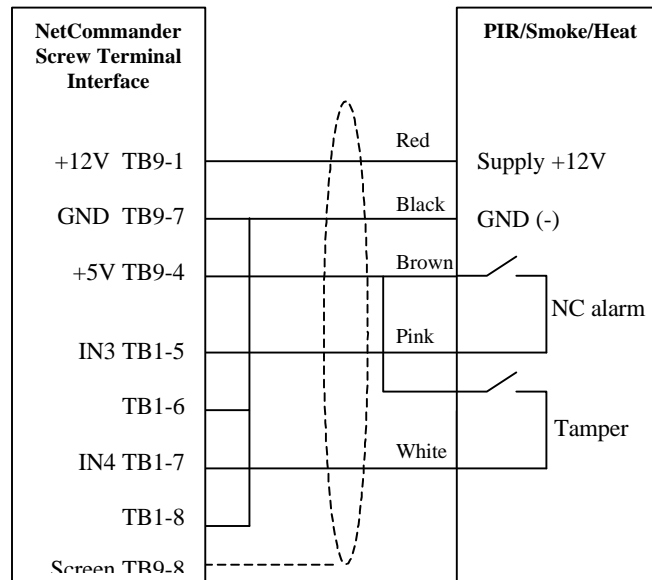
**Note:** To ensure error free operation only Cuberoot approved shielded cabling should be used to connect sensors to NetCommander.

6. Consult your sensor wiring diagram supplied with your Cuberoot sensor. An example wiring diagram for temperature / humidity or combined temperature and Relative humidity sensors is shown in Example 1.



**Example 1 for connecting a temperature / RH sensor**

Example 2 shows the typical wiring requirements for sensors and devices that provide NO or NC volt free alarm and tamper contacts.



**Example 2 connecting a PIR or any volt free contact device**

7. When wiring up devices that provide volt free contacts, make a note of the switch state under alarm conditions. This information will be required later when the event scheduler is set up. Two alarm device conditions (switch states) are supported by NetCommander,

- Alarm low devices - Contacts open when in alarm condition
- Alarm high devices - Contacts closed when in alarm condition

This information has to be correct for NetCommander to give the right alarm status indication.

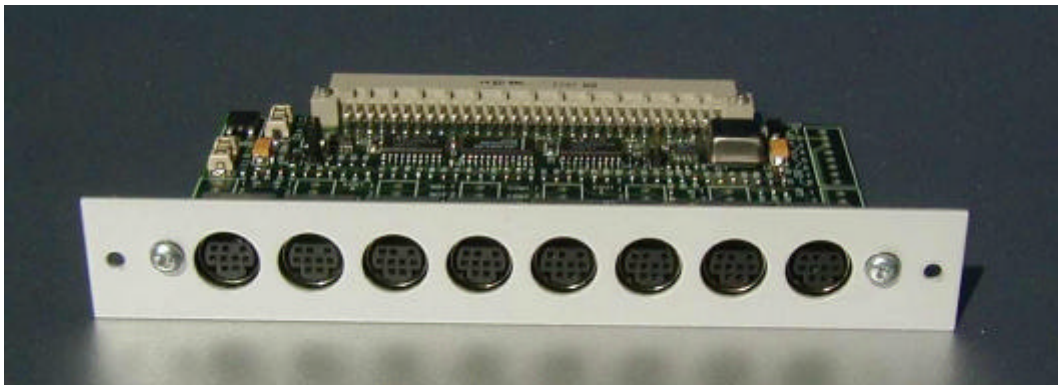
8. In the above examples the temperature sensor uses terminals IN1-1&2, the humidity sensor terminals IN2-3&4 and the PIR, terminals IN3-5&6 and +5v from TB9-+5 on the interface. On the Web interface this relates to input ports 1, 2, and 3 respectively i.e. The temperature will be presented on input port 1 and so on.
9. Terminate all the wiring except the cable screens.
10. Collect together and sleeve the screens of all the cables and terminate at the NetCommander end with a suitably sized Choc-block. Take a single wire from terminal block TB9-GND and connect this to the other end of the Choc-block. This will prevent overloading the small 'GND' terminals.

**Note:** Terminate the cable screens at the NetCommander end only.

11. Once all the cables have been terminated, the cables can be tie-rapped on to the tie-pads, which are located behind the interface fascia.
12. Replace the interface card into NetCommander, complete with wiring.
13. Power up NetCommander.
14. Go to Chapter 7.

## 6.2 Mini-DIN interfaces

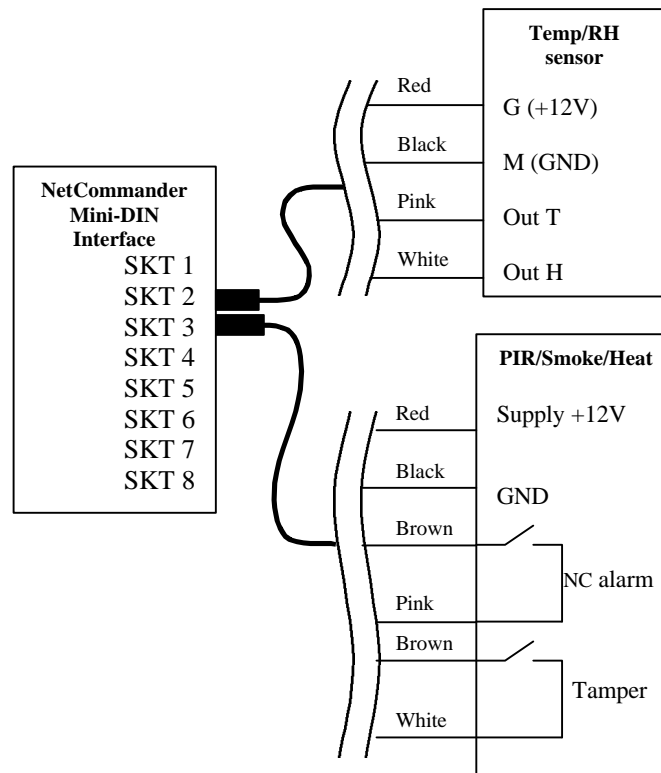
The mini-DIN interface offers installers an extremely quick and easy way of connecting up sensors and devices to NetCommander. A pinout and description of each mini-DIN socket can be found in Chapter 9 of this manual.



1. Before proceeding with the installation of any NetCommander sensors ensure that static precautions have been taken. This will prevent static discharges to any sensitive electronic components.
2. When planning the installation, NetCommander should be positioned such that the maximum cable length to any sensor is not greater than 30 meters. Distances greater than this may result in unacceptable voltage drops and take supply, loop and signaling voltages outside specification.

3. Remove the power connector from the back of NetCommander.
4. When using the mini-DIN interface it is not necessary to remove NetCommander's lid. Connecting sensors to the mini-DIN interface is as simple as inserting the mini-DIN plugs in to any of the available sockets.
5. **Note:** If for some reason the interface needs to be removed, the following procedure should be followed, please remember to take static precautions. Remove the outer most pair of the four screws located on the interface fascia. Take hold of both withdrawal posts on the interface card and pull whilst exerting a force on the back panel of NetCommander. The interface should then pull clear of the box.
6. Position sensors and run mini-DIN terminated wiring as required.
7. Consult your sensor wiring diagram supplied with your Cuberoot sensor. An example connection diagram for temperature / humidity sensors and devices providing volt free contacts is shown below in example 1.

**Note:** To ensure error free operation only Cuberoot approved shielded cabling should be used to connect sensors to NetCommander.



#### Example 1 Connecting a temperature / RH sensor and a PIR using mini-DIN

8. When wiring up devices that provide volt free contacts, make a note of the switch state under alarm conditions. This information will be required later when the



event scheduler is set up. Two alarm device conditions (switch states) are supported by the event scheduler,

- Alarm low devices - Contacts open when in alarm condition
- Alarm high devices - Contacts closed when in alarm condition

This information has to be correct for NetCommander to give the right alarm status indication.

9. In the above example, the temperature and RH sensor uses SKT-1 and the PIR, SKT-3 on the interface. On the Web interface this relates to input ports 1&2 and 5&6 respectively i.e. the temperature will be presented on input port 1 and the humidity on input port 2. The PIR alarm status will be presented on input port 5 and the tamper circuit on input port 6. If the tamper circuit is not connected, input port 6 will not be available to any other sensor. This is due to each mini-DIN socket supporting 2 inputs. The same is true for unconnected outputs and switches, one of each per mini-DIN.
10. To add further mini-DIN wired sensors simply insert the DIN plug into an available port on the interface.
11. Power up NetCommander.
12. Go to Chapter 7.

## 7.0 Configuring a server room monitor

In Sections 6.1-2, wiring examples detailed how to connect up temperature and relative humidity sensors and other devices, such as PIR's, that use volt free alarm contacts. In this section we go a step further and show the typical web interface configuration to support these devices. The example configurations will also show how to link these inputs to e-mail, SMS mobile text, logging and the other functions using the event scheduler.

### 7.1 Send an e-mail when Temperature reaches a set point

In section 6.2, the combined temperature and relative humidity sensor was wired to SKT-1 of the mini-DIN interface. This means that the temperature and humidity readings from the sensor will be presented on input ports 1 and 2 of the web interface respectively.

To configure this first example, we first need to set up input ports 1 and 2 to indicate temperature and relative humidity on the input summary page. The example will then show how to link a temperature set point of 35 - 40 degrees to a **once only** email event using the event scheduler.

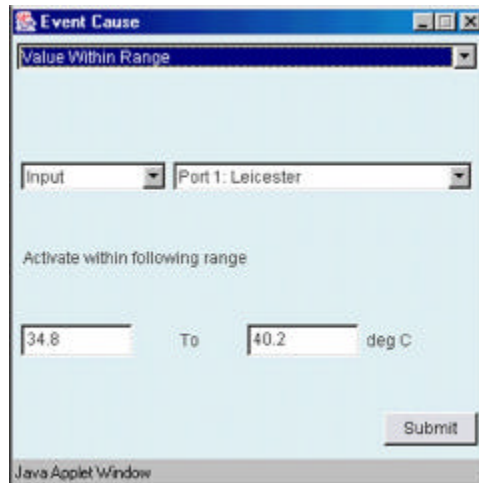
1. Log into NetCommander with full access rights and navigate to the input summary page. Input ports 1 and 2 will indicate the electrical voltage output from the sensor.

2. Click on port 1 and set the 'Name' field to the desired name. This can be a room name, building name or town etc. In this example it has been set to Leicester. The 'Type' field should be set to type Temperature. The 'Value' field is unavailable to users for inputs. Select 'Submit' to submit the entry.

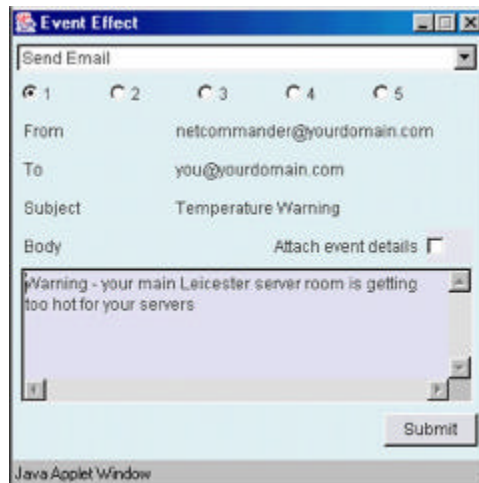
3. Repeat as above for port 2 except for the 'Type' field, which should be set to 'Type' humidity.
4. Input ports 1 and 2 should now indicate the temperature and relative humidity on the input summary page.

5. If not already done so, set up the node name, SMTP server and email message number 1 via the 'Settings' window as required. Users who are unsure how to do this should refer back to Chapter 4.5
6. To set up the e-mail event, navigate to the event summary window.
7. Choose an empty event and click on it
8. Enter the event name, for example Server room temp.
9. Select an <UNUSED> cause, in this case cause 1.
10. From the Cause window select 'Value within Range' from the dropdown menu. New selections will now appear.

11. Select Input and in the adjacent box Select port 1 'Leicester'
12. Under the dialogue text 'Activate within following range' Enter the required trigger value, in this case '35 to 40'. Because of the way NetCommander handles these values, the values may be rounded up or down as shown below. This is nothing to worry about. Select submit.

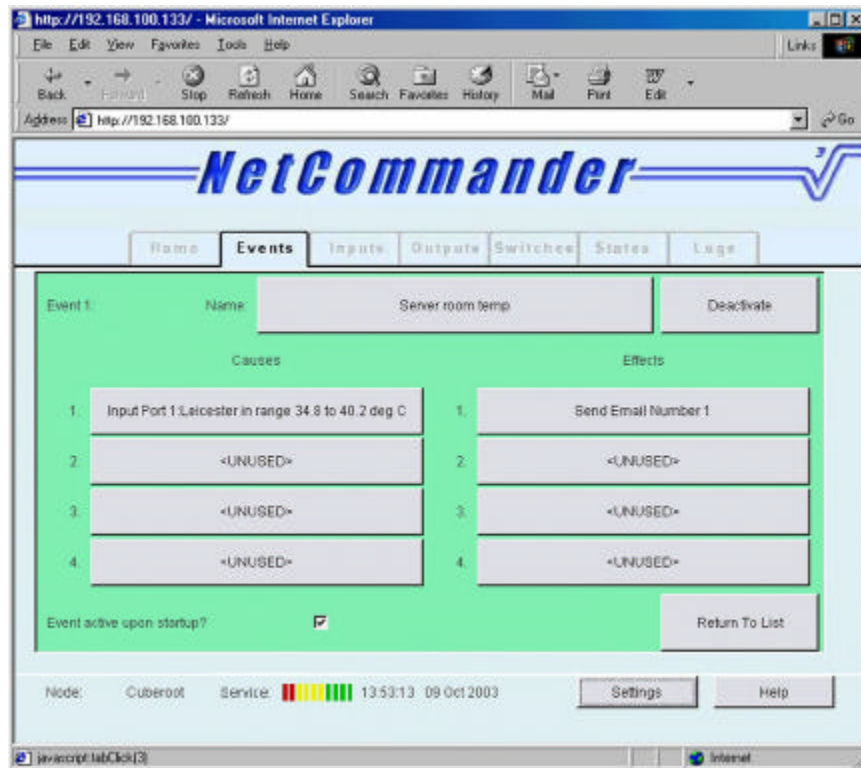


13. Click on effects and Select an <UNUSED> effect. In this example effect 1 has been selected.
14. From the 'Event Effect' pull down menu select Send Email number 1 and select submit.

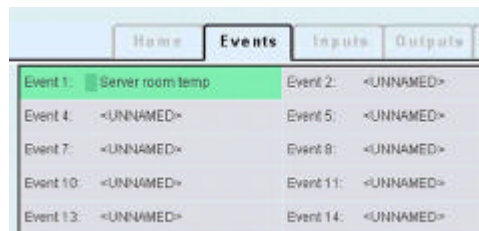


15. Check the 'Event active upon startup' dialogue box if required.

**Note:** An example of when this may be necessary would be following a power cut. The Network servers and NetCommander may boot up but plant equipment may require a start signal. NetCommander would provide this if the event is active on startup and the event is subsequently triggered.



16. Now select 'Activate' located in the top right hand corner of the event window. After a few seconds the event will be activated, the window turning green will indicate this.
17. Navigate back to the event summary window. Event 1 is shown as active, a darker green box within this event indicates that activate on power up is also selected.



When the temperature exceeds 35 degrees centigrade the email event will be triggered and the event deactivated. The event will need to be manually re-activated for further email alerts to be sent. The automatic reactivation of an event is dealt with later in this section.

## 7.2 Setting up devices that provide Volt free contacts

NetCommander also supports any device that provides a volt free contact as an output. This typically includes devices such as PIR's, smoke, heat and CO detectors, but can also include alarms from HVAC units, UPS and security systems. Normally

open (closed in alarm) and normally closed (open in alarm) contacts can be accepted through NetCommander's alarm high and alarm low functionality respectively.

In section 6.2, the PIR sensor was wired to SKT-3 of the mini-DIN interface. The PIR contacts are open when in an alarm state i.e. it is an alarm low device. Assume only one of the two input ports available are being used by the device with this socket. The PIR contacts are presented to input port 5, input port 6 remains unconnected in this example, but could be wired to the tamper circuit as shown in the diagram.

To configure this example, we need to set up input port 5 to accept an alarm low device. When in an alarm condition the port will indicate 'Alarm' and at all other times indicate 'Okay'.

1. Log into NetCommander with full access rights and navigate to the tab input page. Input port 5 will indicate the electrical voltage output from the PIR, this can be either 0 or 5 volts depending on the PIR alarm state.
2. Click on port 5 and set the 'Name' field to the desired name, in this case PIR 1, but it can be a room name, building name etc. The 'Type' field should be set to type 'Alarm Low Device'. The 'Value' field is unavailable to users for inputs. Select 'Submit' to submit the entry.



3. The input summary page should now show the alarm status of the PIR. Depending on the PIR alarm state, port 5 will either indicate Okay or Alarm as below.

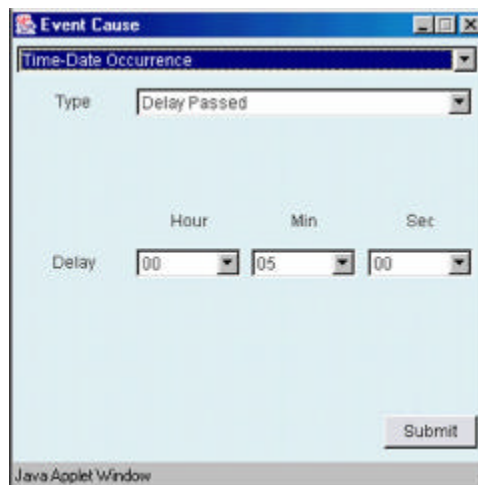


Using the same method as described in the previous configuration example, the user can now configure an email or SMS text event to be triggered as result of an intruder alarm.

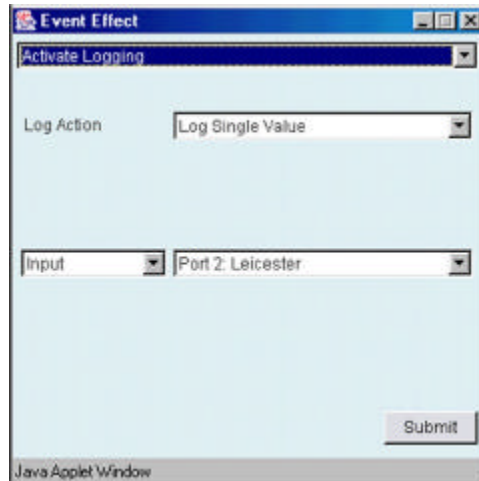
## 7.3 Log an input every 5 minutes

In this configuration example relative humidity readings from the sensor set up in the example of section 7.1 will be logged every 5 minutes.

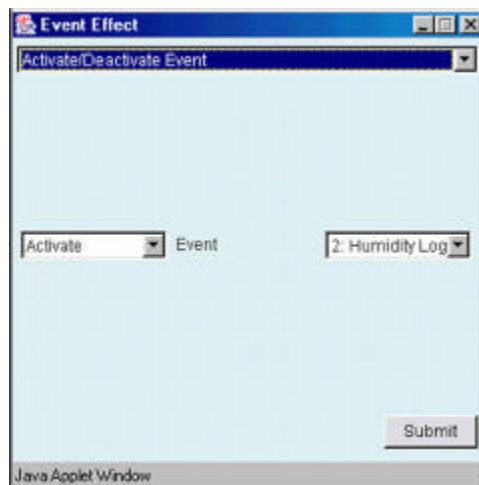
1. Log into NetCommander with full access rights and navigate to the Events summary window, select an empty event by clicking on it. In this example we shall use Event 2.
2. Select Name and enter the desired event name in this case lets call it 'Humidity Log'
3. Select an <UNUSED> cause e.g. Cause 1.
4. From the Cause window select Time-Date Occurrence from the dropdown menu.
5. From the 'Type' drop down menu select 'Delay Passed'.
6. Select the 'Min' pull down and select 05 (5 minutes delay) and select 'Submit'.



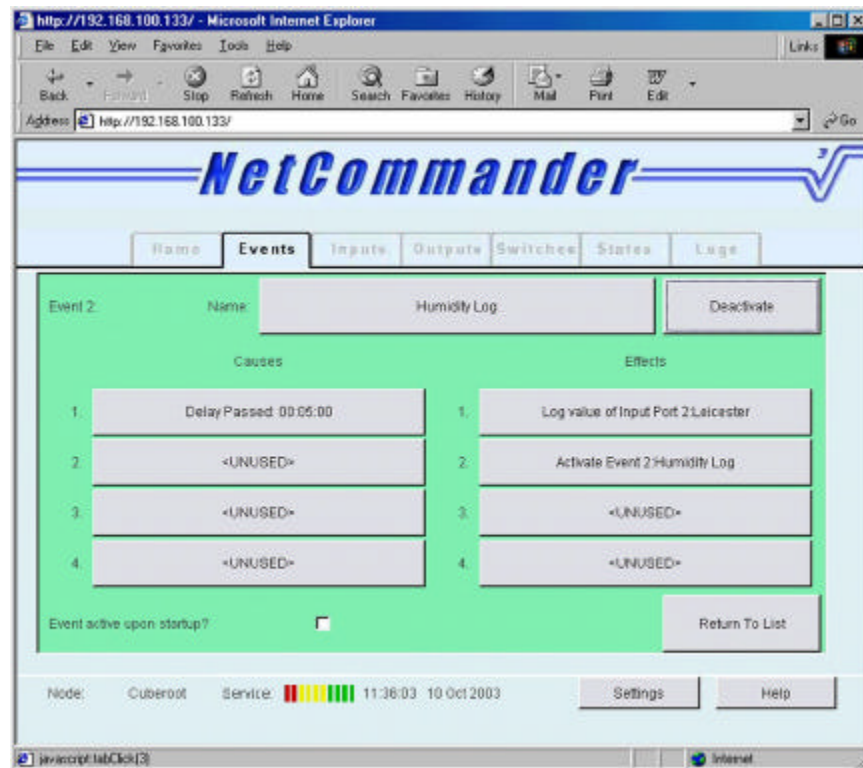
7. Select an <UNUSED> effect e.g. Effect 1.
8. From the Effect window select Activate Logging from the drop down menu.
9. From the Log Action dropdown menu select 'Log Single Value'
10. Select Input as the source and then select 'Port 2: Leicester' from the right hand drop down, which also lists all the other inputs. Select 'Submit'.



11. Select a second <UNUSED> effect e.g. Effect 2
12. From the Effect window select 'Activate/Deactivate Event' from the drop down menu.
13. Select 'Activate' Event
14. Select the event number of this event i.e. '2: Humidity Log' from the right-hand dropdown and select Submit



15. Now 'Activate' the event.



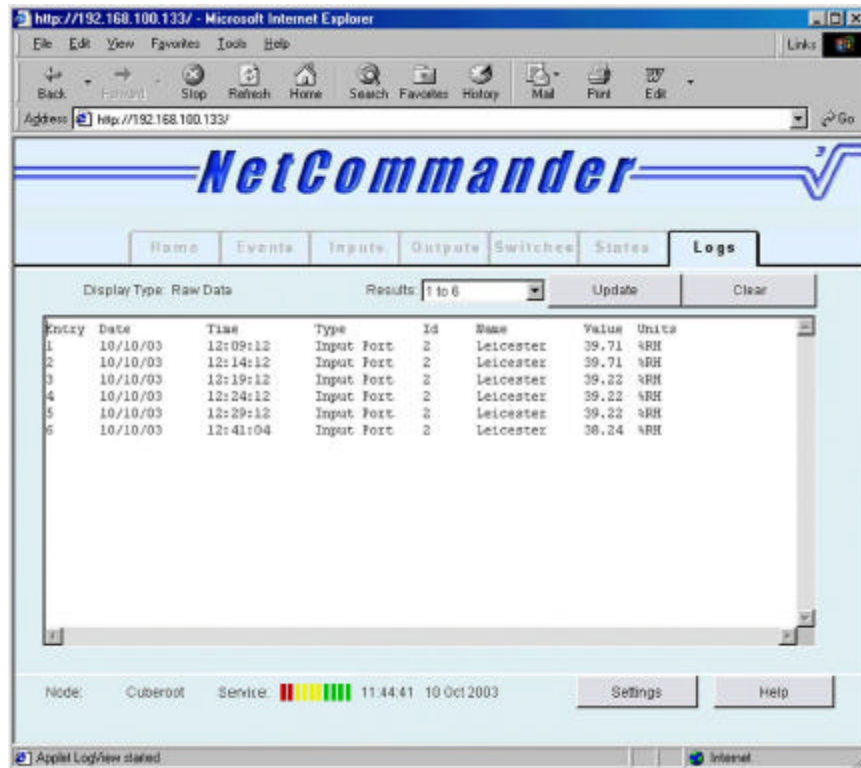
16. Return to the event summary window by selecting 'Return to List' and observe the event summary. Note 'Event active upon startup' has not been selected for Event 2.



The relative humidity will now be logged at 5 minute intervals. When the log memory is full (2048 entries) the logger will begin to overwrite the earlier log entries. If the logs are required, they can be FTP'd to a server. The configuration required to do this is discussed in the next section.

After a suitable interval, navigate to the Logs summary window and select 'Update'. The log entries taken at 5 minute intervals will be listed in the window.





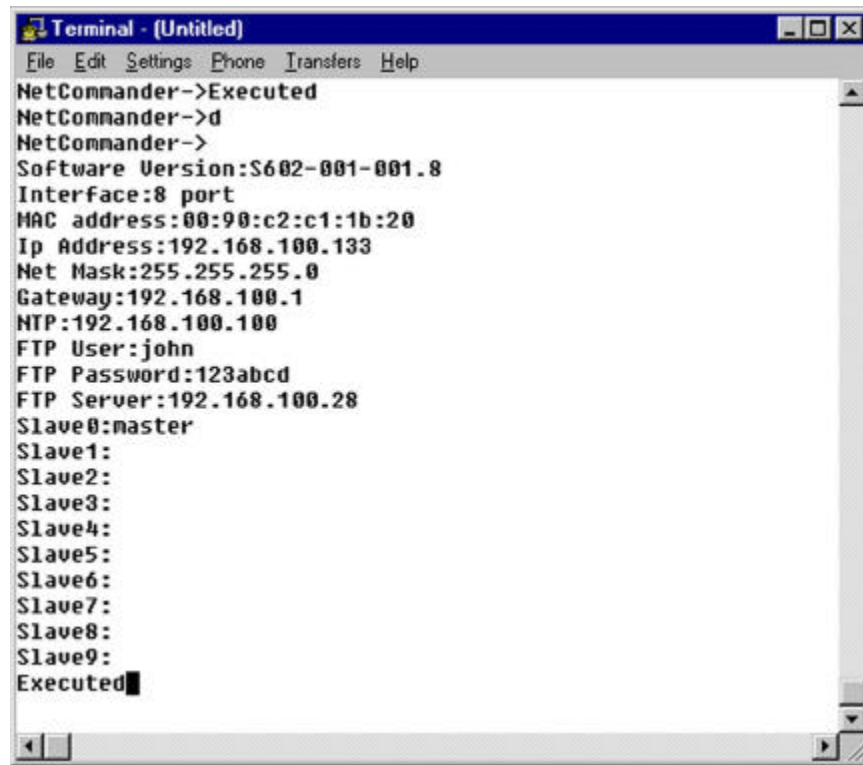
## 7.4 Output the humidity Log to an FTP server daily

In the previous example the configuration required to generate a log of the humidity every 5 minutes was shown. In this example, an additional event will be added to the existing configuration, to FTP the entire log every 10 hours to a specified user account on an FTP server. If a log of the humidity is taken every 5 minutes, there will be approximately 120 log entries in a 10-hour period. Clearly, the user can decide to increase or reduce the sample period / FTP period as required. A maximum of 2048 entries can be in the log at any one time before the earlier entries are over written.

Before setting up the events for this process ensure the following steps have been completed,

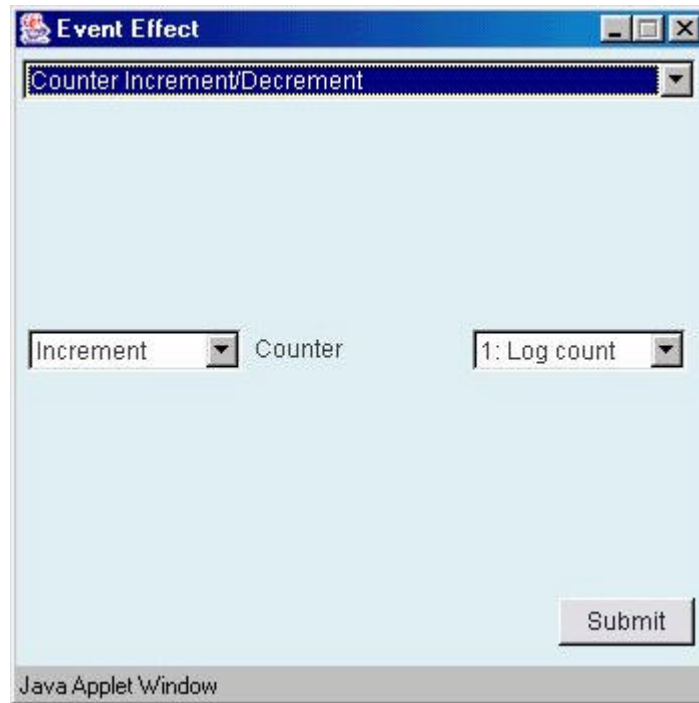
- An FTP server and user account is set up and running on the network
- The username, password and IP address of a user account and FTP server has been set up via a NetCommander serial session. Refer back to Section 4.4 if unsure how to do this.

Enter 'DETAIL' (after power cycling and pressing <Enter>) on a NetCommander serial session, to check that the latter FTP parameters are configured correctly. See example below.

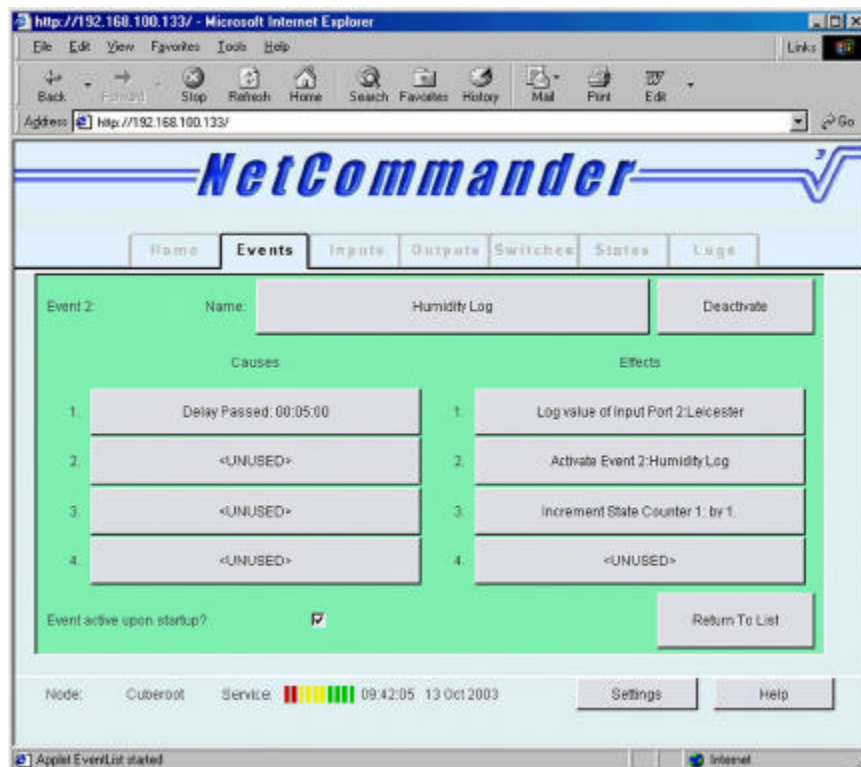


```
Terminal - (Untitled)
File Edit Settings Phone Transfers Help
NetCommander->Executed
NetCommander->d
NetCommander->
Software Version:S602-001-001.8
Interface:8 port
MAC address:00:90:c2:c1:1b:20
Ip Address:192.168.100.133
Net Mask:255.255.255.0
Gateway:192.168.100.1
NTP:192.168.100.100
FTP User:john
FTP Password:123abcd
FTP Server:192.168.100.28
Slave0:master
Slave1:
Slave2:
Slave3:
Slave4:
Slave5:
Slave6:
Slave7:
Slave8:
Slave9:
Executed
```

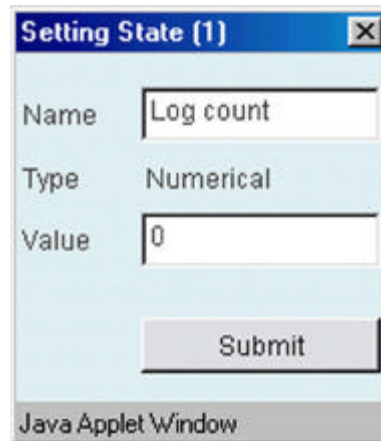
1. Navigate to the Tab Events window and select Event 2 - Humidity Log. If you didn't configure the previous example, then return to Section 7.3. You may wish to change the settings to meet your own requirements. Deactivate the event to edit.
2. Add an Effect (number 3) to the to the existing configuration. The extra event increments state counter for every log entry placed in the log. Select 'Submit.'
3. Check that the new Effect has been added to the event and then select the 'Event active upon startup' box to insure the event is always active on start up.



4. Now reactivate the event.

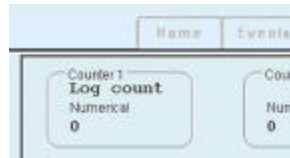


5. Select 'Return To List' to return to the Tab Events window.
6. Navigate to the Tab States window and click on Counter 1. Name the state counter 'Log count' and select Submit.



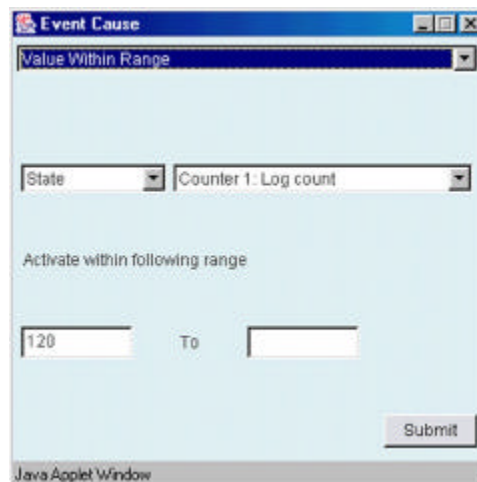
A dialog box titled "Setting State (1)" with a close button (X) in the top right corner. It contains three input fields: "Name" with the text "Log count", "Type" with the text "Numerical", and "Value" with the text "0". Below these fields is a "Submit" button. At the bottom of the dialog, it says "Java Applet Window".

7. The Tab States window now shows that a state counter called Log count has been configured. This counter will be used by NetCommander to indicate the number of log entries in the log. Later in the configuration we will use this count to initiate the FTP process.



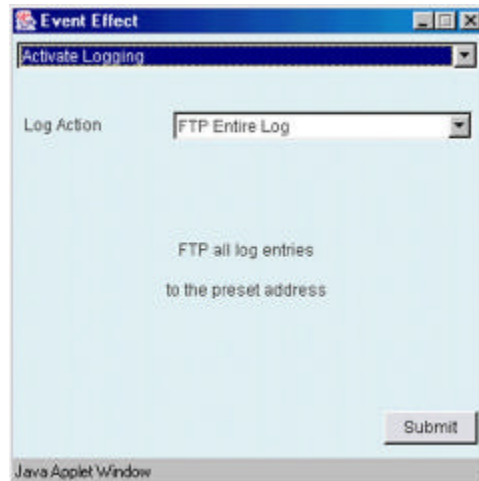
A screenshot of the "Tab States" window. It has two tabs: "Home" and "Events". The "Home" tab is selected. Inside the window, there is a section for "Counter 1" with the name "Log count", type "Numerical", and value "0". To the right, there is a "Count" section with the text "Num" and value "0".

8. Navigate back to the Tab Events window and select the next unused event, in this case Event 3. Name this event, In this case the event is called 'FTP log'.
9. Select an <UNUSED> cause and select 'Value Within Range'. Set the fields within the Event Cause window to State and Counter 1, previously named Log count.

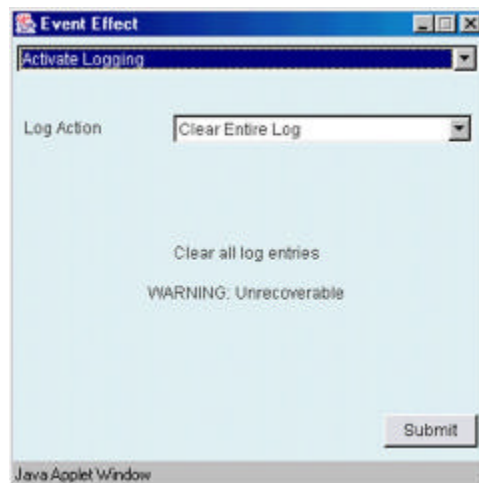


A dialog box titled "Event Cause" with standard window controls (minimize, maximize, close) in the top right corner. It features a dropdown menu at the top with "Value Within Range" selected. Below this are two dropdown menus: "State" and "Counter 1: Log count". Underneath, the text "Activate within following range" is displayed. There are two input fields for a range, with "120" entered in the first and a "To" label between them. A "Submit" button is located at the bottom right. At the bottom of the dialog, it says "Java Applet Window".

10. Set the Activate within range to a value of 120 i.e. the number of 5 minute logs in a 10-hour period.
11. Next select the first 'Effects' entry for this event and select Activate Logging.
12. From the Log Action pull down menu select 'FTP Entire Log' and then select 'Submit'

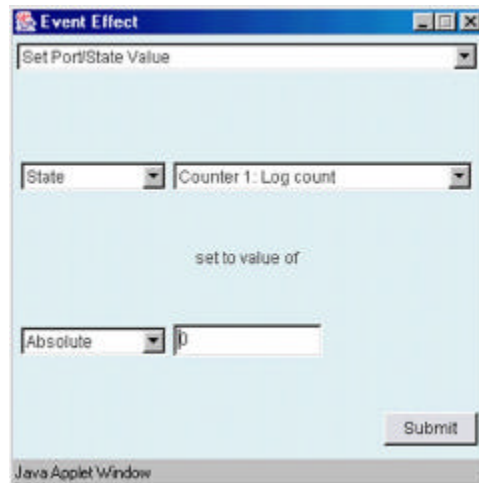


13. In the next available 'Effects' field, select Activate Logging.
14. But this time from the Log Action pull down menu select 'Clear Entire Log' and then select 'Submit'.

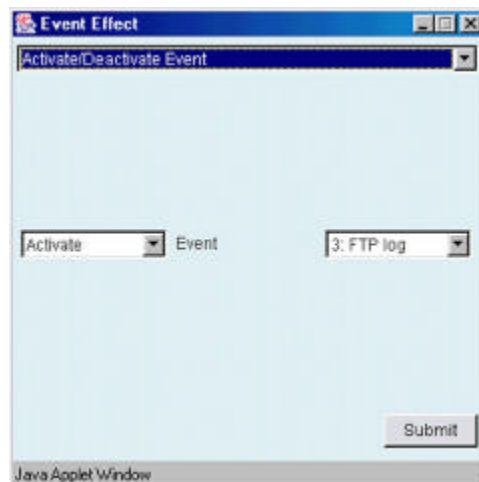


15. In the next available 'Effects' field, select 'Set Port/State Value'.
16. From the top pull down menus select 'State' and 'Counter 1:Log count'. From the 'set to value of' pull down select 'Absolute' and 0. Select 'Submit' to submit the

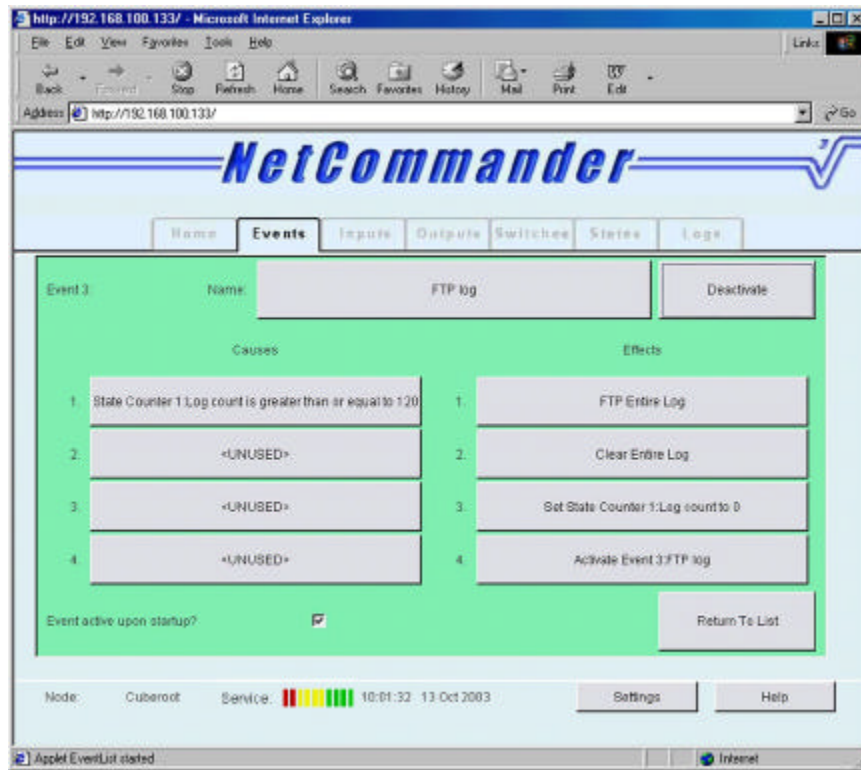
details. This effect will reset the counter to zero after the event is triggered and the log entries have been FTP'd to the server.



17. In the next available 'Effects' field, select 'Activate/Deactivate Event'.
18. From the down menus select 'Activate' event and then select this event i.e. Event 3: FTP log. The event will be reactivated automatically after being triggered i.e. every time the count and thus the number of log entries reach 120.



19. Check the 'Event active upon startup' box to insure the event is always active on start up.



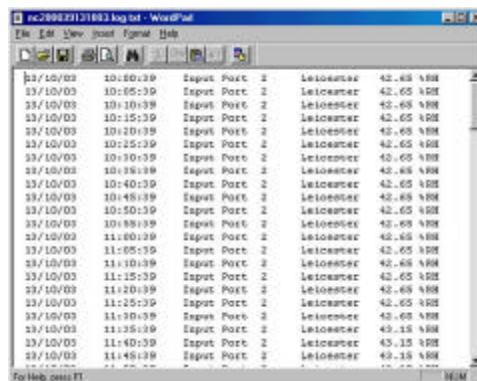
20. Reactivate the event and select 'Return To List'

21. Every 10 hours the log entries will be FTP'd to the FTP server. The log files are preceded with 'nc' followed by the time (hour's hh, minute's mm and seconds ss) and the date (day DD, month MM, and year YY). An example is shown below.

**nc.log**

A typical log entry might look like this **nc103509131003.log**

Log files can be directly imported into Microsoft Excel and graphed as required.



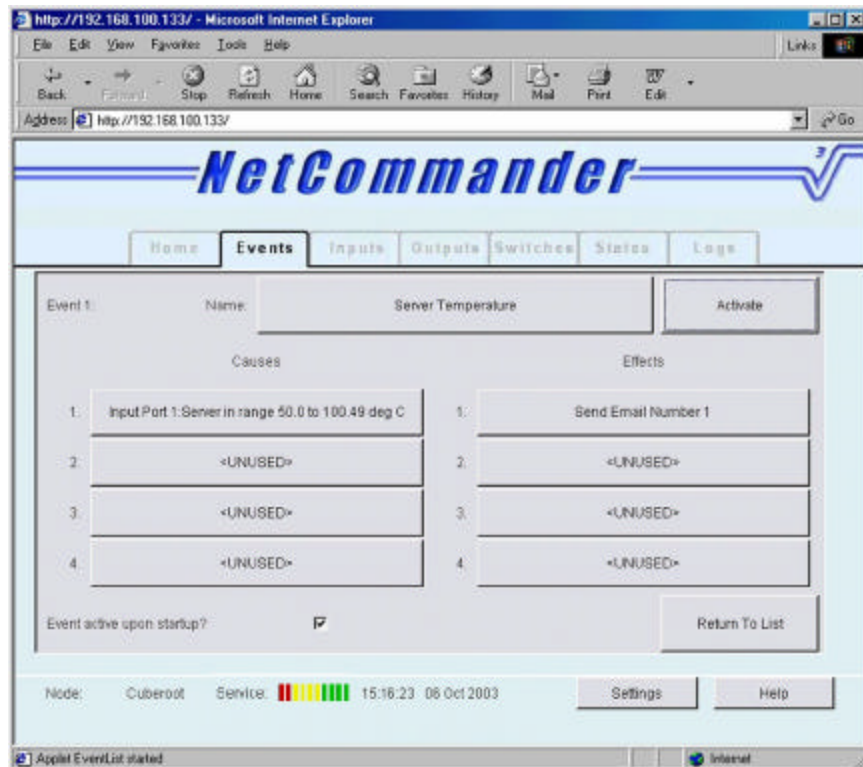


## 7.5 Automatically resetting an event when alarm condition has passed

In the example of Section 7.1 NetCommander was configured to send an email if the port 1 temperature exceeded a set value. Once the event was triggered, no further email events would be sent and the event itself would be deactivated. Manual intervention would then be required to reactivate the event. An alternative to this is to let NetCommander reactivate the event automatically when the temperature is restored to its normal value. The event would then be ready to send an email if the temperature was to once again increase above the set point.

**Note: All NetCommander events are by design one shot i.e. the causes will only trigger the effects for a particular event once. By reactivating the event, either by itself or by using another event, multi-shot events can be configured.**

In Section 7.1 Event 1 was configured to send an email if the temperature exceeded 50 degrees centigrade. This example will build on this event by adding another event, which will reactivate Event 1. The existing configuration for Event 1 is shown below.

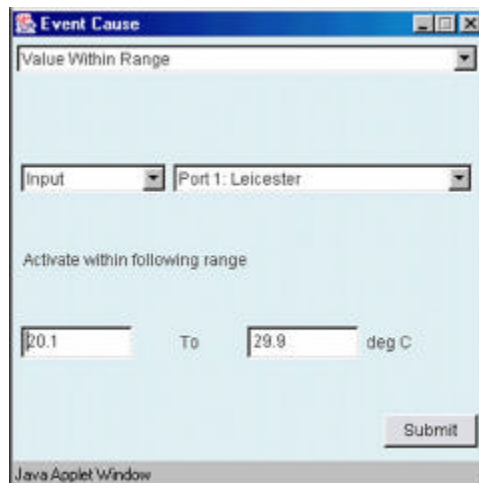


1. Navigate to the Tab Events window and select the next available unused event. In this example this is Event 4. If the pre-requisite configuration is not present, then return to Section 7.1. You may wish to change the settings to meet your own requirements. Deactivate the event to edit.

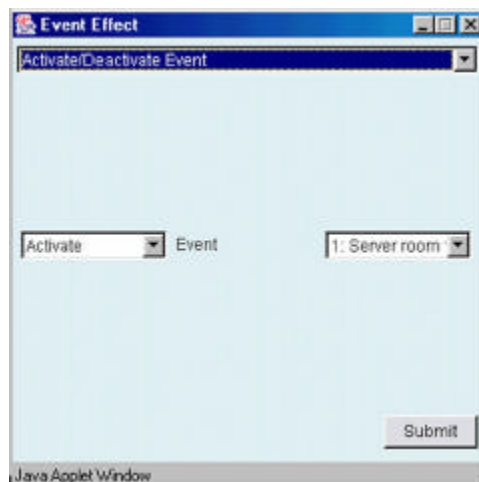


2. From the Cause window select 'Value within Range' from the dropdown menu. New selections will now appear.
3. Select Input and in the adjacent box Select port 1 'Leicester'
4. Under the dialogue text 'Activate within following range' Enter the normal temperature that will re-trigger Event 1, in this case '20 To 30'. Because of the way NetCommander handles these values, the values may be rounded up or down as shown below. This is nothing to worry about. Select Submit.

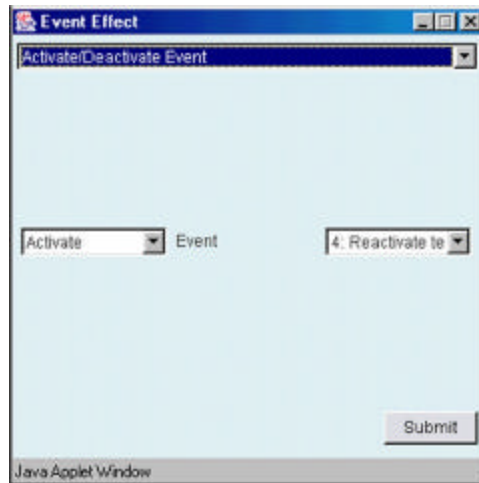
**Note:** Do not overlap the original and retrigger temperatures, as this may result in a program loop being set up and events not working as expected.



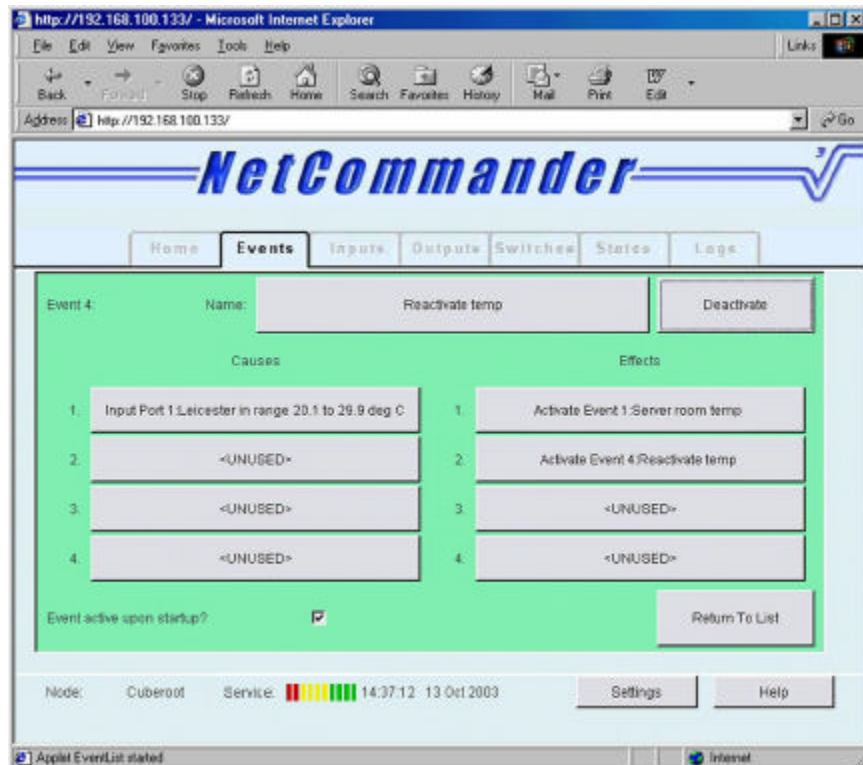
5. Click on the first 'Effects' field and select 'Activate/Deactivate Event'.
6. From the pull down menus select 'Activate' event and then select event '1: Server room temp'. This will have the effect of reactivating Event 1 when the temperature is within its normal range i.e. 20-30 degree centigrade.



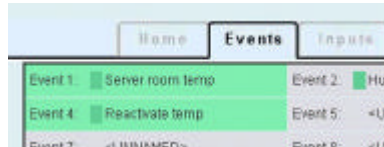
7. In the next available 'Effects', select 'Activate/Deactivate Event'.
8. From the pull down menus select 'Activate' event and then select this event '4: Reactivate temp'. The will have the effect of reactivating this event when the temperature is within its normal range i.e. 20-30 degree centigrade. Select 'Submit' to save the effect.



9. Check the 'Event active upon startup' dialogue box to insure the event is always active on start up. Event 4



10. Reactivate the event and select 'Return To List'. A summary of the Tab events window shows Events 1 and 4 activated and ready to go.

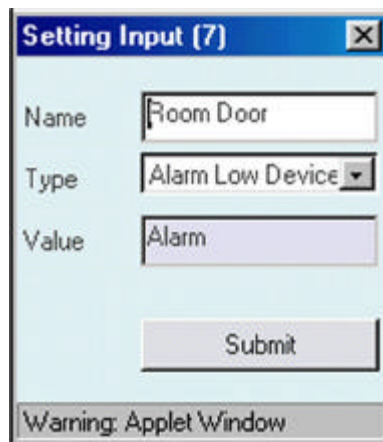


### 7.5.1 Another event reset example

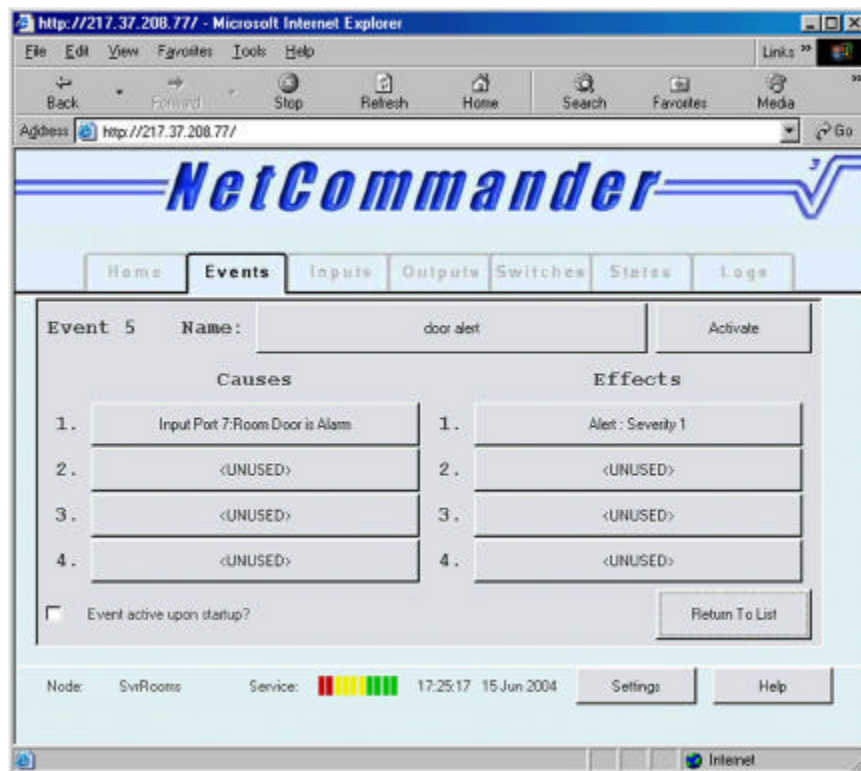
So far we have used event resets to re-activate an event that logs temperature readings every 5 minutes and to re-activate a temperature alarm event, if and when the temperature falls back to normal following an alarm condition. In this example, NetCommander will continuously monitor a door contact. When opened, the door will trigger a visual alert. If the door is then closed, the event will be re-activated and ready to trigger further alerts should the door be opened again.

**Note: All NetCommander events are by design one shot i.e. the causes will only trigger the effects for a particular event once. By reactivating the event, either by itself or by using another event, multi-shot events can be configured.**

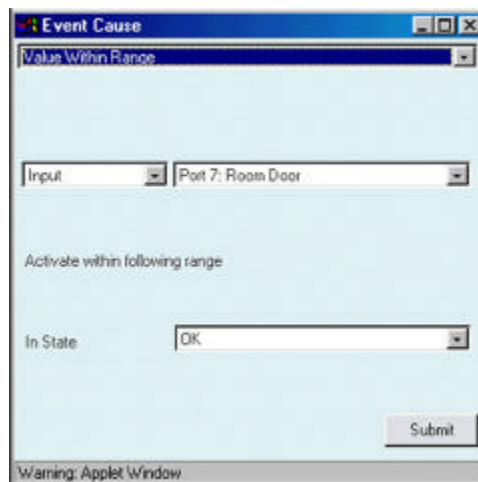
1. Set up an input to monitor door contacts that provide an alarm state when the door is opened (contacts open)



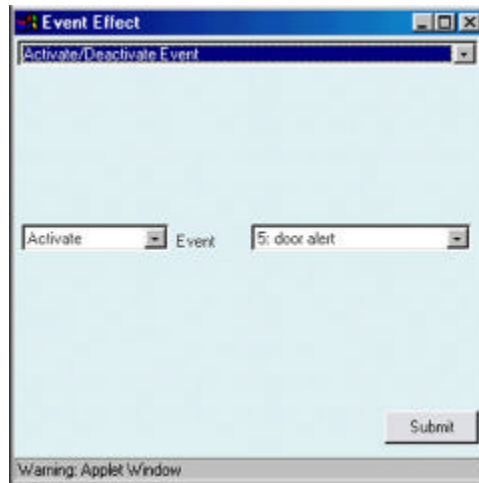
2. Set up an event to alarm and send a visual alert to a host PC when the door is opened.
3. With the door closed select 'Activate' to activate the event.



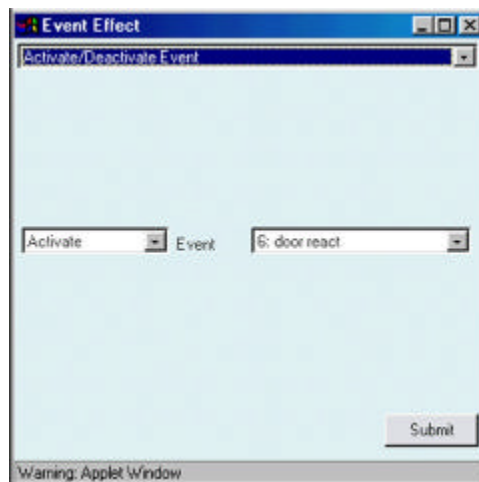
4. Return to the events summary list and select the next available unused event, event 6 in this example.
5. From the Cause window select 'Value within Range' from the dropdown menu. New selections will now appear.
6. Select Input and in the adjacent box Select port 7 'Room Door'



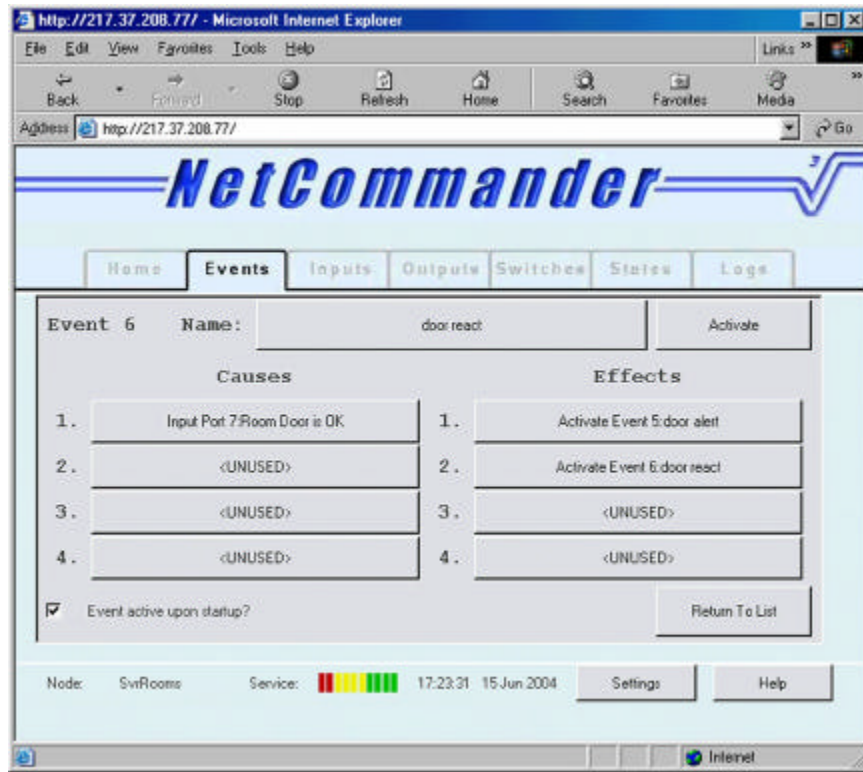
7. Under the dialogue text 'Activate within following range', select the state 'O.K'. This will activate the event when the door is closed, when complete select Submit.
8. Click on the first 'Effects' field and select 'Activate/Deactivate Event'.
9. From the pull down menus select 'Activate' event and then select event '5: Door alert'. This will have the effect of reactivating Event 5 when the door is closed



10. In the next available 'Effects', select 'Activate/Deactivate Event'.
11. From the pull down menus select 'Activate' event and then select event '6: door react'. This will have the effect of reactivating this event when the Door is closed. Select 'Submit' to save.



12. Check the 'Event active upon startup' dialogue box to insure that event 6 is always active on start up.



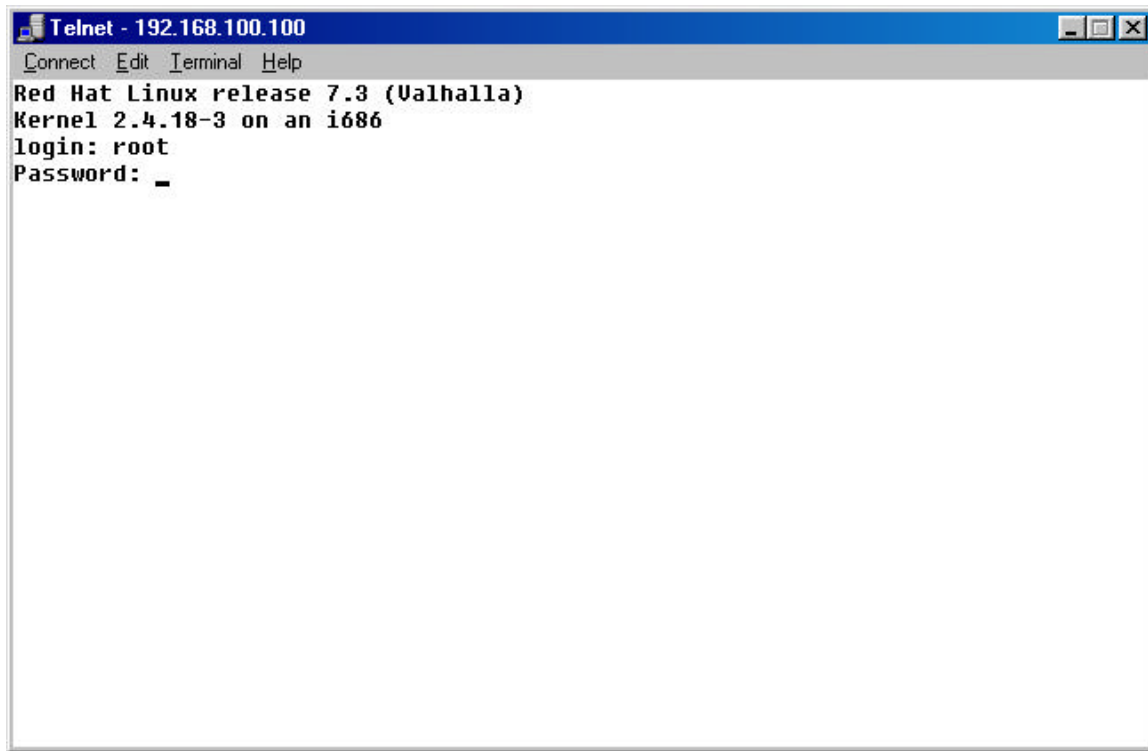
13. Select 'Activate' and return to the events summary window. Events 5 and 6 will be activated and ready to go. The door monitoring configuration is now complete.

## 8.0 Remote IP Telnet serial session

The NetCommander Telnet serial session can be used to support terminal server and remote IP to serial access applications. A single session per NetCommander is available. This functionality can be used whenever a remote serial device i.e. router configuration or remote server serial debug port, needs to be connected to the LAN.

**Note:** To use this functionality the user must have quit from the serial system configuration session. Unless the user has attempted to change the system configuration, NetCommander will always default to standard serial functionality after 5 seconds following a power cycle.

1. Connect a suitable serial cable between the NetCommander serial port and the serial port on the router or server etc. The session communication parameters should be set as follows 9600,8,none,1.
2. Initiate a Telnet session from your local or remote host to NetCommander



3. Enter user and password information for serial session on serially connected device.
4. Press 'Enter' to get device prompt
5. When finished enter quit or exit

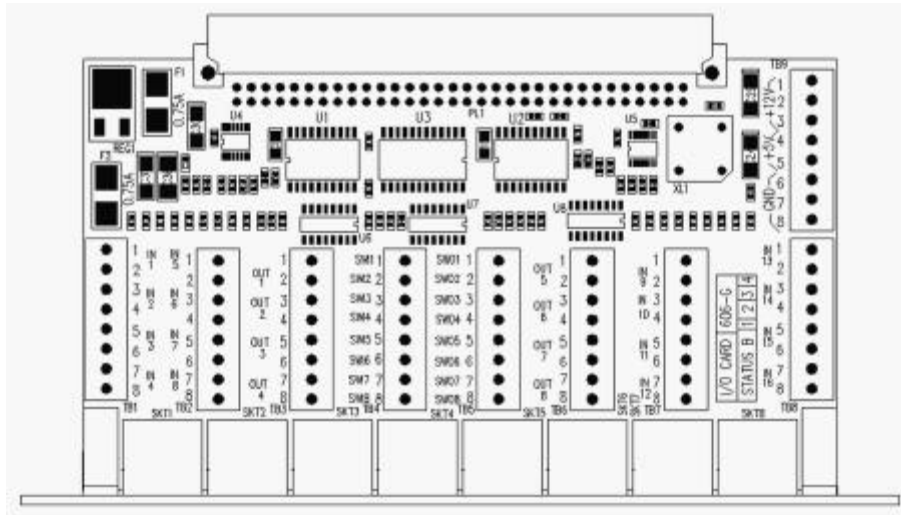
## 9.0 Hardware Connectors

This section describes the use and the pin out of each of the connectors on the back panel and interfaces of NetCommander.



## 9.1 Screw terminal interface connectors

The pinout for the 8 port screw terminal interface is shown below. Each set of screw terminals is presented on a terminal block (TB). Terminal block numbering is towards the front of the interface near the faceplate. Four port screw terminal variants are not fitted with TB6, TB7 and TB8.



### Terminal Block (TB) key

- TB1: IN 1-4 (Input ports 1-4)
- TB2: IN 5-8 (Input ports 5-8)
- TB3: OUT 1-4 (Output ports 1-4)
- TB4: SWO 1-8 (Normally open (NO) contacts 1-8)
- TB5: SWI 1-8 (Common for the NO contacts on TB4)
- TB6: OUT 5-8 (Output ports 5-8)
- TB7: IN 9-12 (Input ports 9-12)
- TB8: IN 13-16 (Input ports 13-16)
- TB9: +12v, +5v, GND supply

**IN 1-16 – NetCommander input ports.** Each input port consists of a signal and a ground connection. The signal for ports 1-4 should be connected to terminals 1,3,5 and 7 respectively on Terminal block 1. Ports 5-8, 9-12, 13-16 can also be found on terminals 1,3,5,7 on TB 2,7 and 8 respectively. The ground for each input port is on terminals 2,4,6,8 of the respective terminal blocks.

**OUT 1-8 - NetCommander Output ports.** Each output port consists of a signal output and a ground connection. The signal for output ports 1-4 should be connected to terminals 1,3,5 and 7 respectively on Terminal block 3. Ports 5-8 can also be found on terminals 1,3,5,7 on TB 6. The ground for each output port is on terminals 2,4,6,8 of the respective terminal blocks.

**SWO 1-8 - NetCommander NO switch output ports.** Each switch port consists of a NO contact and a switch common. The switch contact output ports 1-8 should be connected to terminals 1-8 respectively on Terminal block 4.

**SWI 1-8 - NetCommander switch output common ports.** The commons for switches 1-8 should be connected to terminals 1-8 respectively on Terminal block 5.



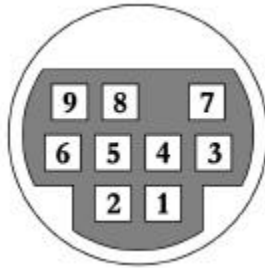
**+12 volts Equipment supply.** This is intended to be used as a power source for NetCommander's remote sensors. The supply is fused with a 750 mA re-settable fuse. If the rails are shorted to ground the fuse will go to a high resistance state, but will return to normal state when the short circuit is removed.

**+5 volts Loop supply voltage.** This is intended to be used as a loop signal, which is switched by volt free alarm contacts on a remote sensor back to an input on NetCommander. It should not be used to power any remote sensing devices. A 750 mA re-settable fuse protects the loop supply. If the rails are shorted to ground the fuse will go to a high resistance state, but will return to normal state when the short circuit is removed.

**GND – 0 volts.** This is the return for the loop and supply voltages

## 9.2 9-Pin Mini DIN interface connector

The 9-pin mini-DIN socket used in the 4 and 8 port mini-DIN interfaces is shown below. The view of the socket pinout is that observed when looking at the back of NetCommander with the interface fitted. The 4 port variant is not fitted with socket (SKT) 5-8.



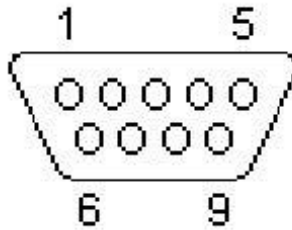
Mini-DIN	Cable colour	Function
Pin 1	Pink	1 <sup>st</sup> Analogue Input port (0-5 V)
Pin 2	White	2 <sup>nd</sup> Analogue Input port (0-5 V)
Pin 3	Brown	+ 5V Signalling voltage
Pin 4	Yellow	Switch (volt free normally open contact)
Pin 5	Green	Switch common
Pin 6	Red	+12V Supply voltage
Pin 7	Blue	Analogue ground
Pin 8	Grey	Analogue output 0-5 V
Pin 9	Black	Digital ground
Shield	Shield	Digital ground

### Notes.

- See screw terminal interface connector for full description of I/O.
- Inputs are between pins 1 or 2 and pin 7.
- Output is between pins 8 and 7.
- +5 and +12 are between 3 or 6 respectively and pin 9.

### 9.3 Configuration/Serial - RS-232 DB-9 connector

The view of the socket pinout is that observed when looking at the back of NetCommander.

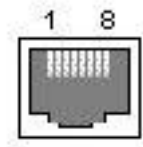


The Serial interface is a 3-wire interface, (Transmit, Receive and Ground). Pin out is as follows.

- Pin 1:** - DCD Looped to Pin 4
- Pin 2:** - RXD (I/P)
- Pin 3:** - TXD (O/P)
- Pin 4:** - DTR Looped to pin 1
- Pin 5:** - Ground
- Pin 6:** - NC
- Pin 7:** - RTS Looped to Pin 8
- Pin 8:** - CTS Looped to Pin 7
- Pin 9:** - NC
- Shield:** -Ground

### 9.4 Ethernet - Standard RJ45 10BaseT connector

The view of the socket pinout is that observed when looking at the back of NetCommander.



The Ethernet port is presented as an RJ45 interface with the following standard pin out.

- Pin 1:** - Transmit pair
- Pin 2:** - Transmit pair
- Pin 3:** - Receive pair
- Pin 4:** - Not connected
- Pin 5:** - not connected
- Pin 6:** - Receive pair
- Pin 7:** - Not connected
- Pin 8:** - Not connected
- Shield:** - Ground

## 10.0 Fault finding

The following table can be used to fault find the most common NetCommander equipment faults. If a fault persists and cannot be rectified by any of the following actions contact your support organisation.

Symptom	Check points
Ethernet link light not illuminated	<ul style="list-style-type: none"> <li>No power</li> <li>Defective cable</li> <li>Wrong cable type (straight/crossover)</li> </ul>
Ethernet activity light not flashing	<ul style="list-style-type: none"> <li>No network activity or network connection</li> </ul>
Web page not loading	<ul style="list-style-type: none"> <li>Check serial configuration and then try to ping the PC</li> <li>Check network connection</li> <li>Check URL correct</li> <li>Check browser supported</li> <li>Check Java version</li> <li>Check proxy/firewall not blocking web access on port 80</li> </ul>
Temperature, Humidity, Alarm Low and Alarm High devices not available as an input or output type	<ul style="list-style-type: none"> <li>Defaults have not been restored on start up. Run serial utility and enter 'CLEAR' followed by 'INIT' to restore default settings.</li> <li>Conversion not assigned to that I/O type</li> </ul>
Serial utility fails to connect	<ul style="list-style-type: none"> <li>Press enter within 5 seconds</li> <li>Re-run terminal / Hyperterm utility</li> <li>Check serial parameters on PC</li> <li>Check you have correct serial cable (X800-1012)</li> </ul>
Output port not functioning	<ul style="list-style-type: none"> <li>Set output to 5 volt and check the output voltage with a multimeter</li> </ul>
Input port not functioning	<ul style="list-style-type: none"> <li>Loopback 5v line on interface and check input value (5 volts)</li> </ul>
Events not triggering	<ul style="list-style-type: none"> <li>Check event is active</li> <li>Event not configured correctly</li> </ul>
Manually configured Time incorrect	<ul style="list-style-type: none"> <li>Power loss has occurred - re-enter time and date</li> </ul>
NTP Time incorrect	<ul style="list-style-type: none"> <li>Ping NTP server from NetCommander serial session</li> <li>Check time server</li> <li>Check default gateway</li> </ul>

FTP not working	<ul style="list-style-type: none"> <li>• Ping FTP server from NetCommander serial session</li> <li>• Check FTP server IP address</li> <li>• Check default gateway correct</li> <li>• Check username and password</li> </ul>
Email not working	<ul style="list-style-type: none"> <li>• Check SMTP server IP address correct</li> <li>• Check default gateway correct</li> <li>• Check SMTP server allows NetCommander as a email client</li> </ul>
SMS not working	<ul style="list-style-type: none"> <li>• Check that Email is functioning correctly - see above</li> <li>• Check email to SMS service provider</li> </ul>
No +12 v supply to external sensors	<ul style="list-style-type: none"> <li>• Self-rectifying fuses seeing fault/short on 12v supply. Remove all connections and check with multi-meter.</li> <li>• Check interface common connected</li> </ul>
No +5 v loop supply to external sensors	<ul style="list-style-type: none"> <li>• Self-rectifying fuses seeing fault/short on 12v supply. Remove all connections and check with multi-meter.</li> <li>• Check interface common connected</li> </ul>
No Inputs, Outputs or Switches shown on Web interface	<ul style="list-style-type: none"> <li>• Check interface fitted</li> <li>• Check interface located correctly</li> </ul>

## 11.0 Technical specification

### Micro-controller

Compact Micro-controller with 512k flash 512k SRAM.

### Web

Built in web server and SMTP email client. NetCommander is accessed via a Web interface utilising served Java applets allowing real time update and control of status and I/O.

### Browser support

Netscape Navigator 7.x + (RH Linux 9.0 with Netscape 7.1)

Microsoft Internet Explorer 6.x +

Mozilla 1.2.1 + (Red Hat Linux 9.0 + Java VM 1.4.2)

### Java support

Microsoft VM / SUN Java VM Plug-in Version 1.3 +

### I/O interfaces

10Base-T Ethernet

RS-232 and RS-485 Serial communications,

16 Analogue inputs 0-5v

8 Analogue outputs 0-5v

8 switch outputs 200mA max

### Power requirements

12v @ 100mA provided by mains AC adapter

### Standards

CE Marked

### Enclosures

- 160mm x 100mm x 55mm (Standard home and office)
- Enclosure to IP65 available

### Weight

- 700g approx.

### Maximum environmental conditions

- Temperature 0 to +40 Degrees Centigrade
- Relative humidity 20%-80% non-condensing

### A/D inputs

There are 8-16 Analogue inputs which can be read from the CPU. Max Volts input to any Analogue input = 0-5V. The inputs are configured as Uni-polar inputs. The A/D converter (LTC1090) is a 10 bit device.

### D/A Outputs

There are 4-8 Analogue outputs that can be written to by the CPU. Max Voltage output from any Analogue output is 0 - 5V. The outputs are configured as Uni-polar outputs. The D/A converter (LTC1664) is a 10 bit device.

**Analogue switch I/O**

There are 8 SPST (Single Pole Single Throw) switches. The contacts have a resistance of 125ohms typical and an absolute max, continuous current input to any switch input of 20mA @ 7 Volts

**Supply voltage**

This unit is designed to use a mains adapter that supplies a regulated 12 Volts @ 1 Amp to the DC Input of NetCommander. NetCommander takes approximately 200mA at +5Volts.

**12 Volt DC Supply (for sensors and devices)**

The DC output is a direct connection to the 12 v DC Input of NetCommander. Available power for this purpose is 750mA max.

**5 Volt DC Loop voltage (for extension purposes)**

A direct connection to the +5 Volt rail of the unit can be used to supply a loop voltage for sensors and devices providing volt free alarm contacts. Max Output available is 750 mA

**WARNING: The +12 V and +5 V supply and loop outputs are protected from short circuits using PTC re-settable fuses.**

## Appendix I Sensor conversion / calibration

A range of default sensors come ready supported by the NetCommander conversion utility. The conversion utility provides a means of scaling the input and output voltages of the default sensors and alarm high / low devices to the correct units. Under normal circumstances the calibration of these sensors will not need to be changed. To support other sensors, an 'Unused' type has been included, which allows the user to define and calibrate an additional sensor type e.g. a pressure sensor.

To view the conversions information, click on the 'settings' dialogue button in the bottom right hand corner of the welcome page. NetCommander will serve the 'Settings' configuration page in a new window.

### Default sensor types

The current default sensors supported by NetCommander include temperature, humidity, alarm low and alarm high devices. The conversions for these devices are pre-configured as part of the system defaults. Select the 'Type' pull down menu in conversions to view the available conversion types.

The image shows two screenshots of the 'Settings' dialog box, which has tabs for Node Name, Date/Time, Password, Debug, Conversions, Mail Server, Email, and SMS. The 'Conversions' tab is active in both.

**Left Screenshot:** The 'Type' dropdown is set to 'Temperature'. The 'Name' field contains 'Temperature'. The 'Device Type' dropdown is set to 'Analogue'. The 'Applies to...' dropdown is set to 'Input Ports only'. The 'Units' field contains 'deg C'. Below this, there are two columns: 'Low' and 'High'. The 'Voltage' row has values '0.0' and '1.0'. The 'Scaled' row has values '0.0' and '100.0'. A 'Submit' button is at the bottom right.

**Right Screenshot:** The 'Type' dropdown is set to 'Alarm Low Device'. The 'Name' field contains 'Alarm Low Device'. The 'Device Type' dropdown is set to 'Digital (Alarm Low)'. The 'Applies to...' dropdown is set to 'Input Ports only'. The 'Units' field is empty. Below this, there are two columns: 'Low' and 'High'. The 'Voltage' row has values '0.0' and '5.0'. The 'Scaled' row has values 'Alarm' and 'OK'. A 'Submit' button is at the bottom right.

Both screenshots have a 'Warning: Applet Window' message at the bottom.

These device conversions are available when selecting the input 'Type' for a specific input from the main input summary window.

The image shows the 'Setting Input (1)' dialog box. It has a 'Name' field containing 'Server'. The 'Type' dropdown is set to 'Temperature'. The 'Value' dropdown is open, showing a list of options: 'Electrical', 'Temperature' (which is highlighted), 'Humidity', 'Alarm Low Device', and 'Alarm High Device'. At the bottom, it says 'Java Applet Window'.

## User defined sensor type

The function also provides an 'UNUSED' type, this can be user defined and scaled to support almost any type of sensor that provides a signal output  $\leq 5v$ .

1. From the 'Type' pull down menu select 'Unused' and rename with the type of sensor to be added. In this example a pressure sensor has been added

The screenshot shows the 'Settings' dialog box with the following fields and values:

Field	Value
Type	Pressure
Name	Pressure
Device Type	Analogue
Applies to...	Input and Output Ports
Units	psi
Voltage Low	0.0
Voltage High	3.0
Scaled Low	0.0
Scaled High	50.0

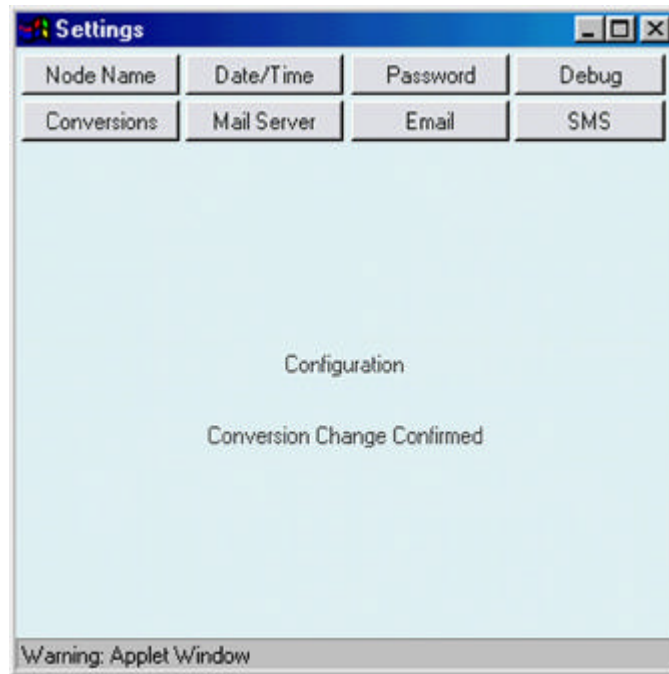
Buttons: Submit

Warning: Applet Window

2. In the 'Name' dialogue box enter the name of this conversion. By default this will be the same as the 'Type' field. Change if necessary.
3. From the 'Device Type' pull down menu, select 'Analogue' if the sensor provides an analogue output or device high / low if the sensor provides a volt free contact. In this case the pressure sensor provides an analogue output.
4. In the 'Applies to' pull down menu select what ports the conversion will be available to.
5. In the 'Units' dialogue box enter the pressure or measurement units i.e. Psi, kPa
6. In the 'Voltage' Low/High fields enter the lowest to highest scale output voltage of the pressure sensor for the pressure range.
7. In the 'Scaled' Low/High fields enter the low/high pressure range relating to the sensor output voltages entered previously. In this case a sensor voltage of 0 - 3 volts relates to a pressure range of 0 - 50 Psi.
8. Select 'Submit' to submit the changes to the conversion function.



9. The conversion type will now be made available as a conversion to the port types defined in the 'Applied to' field of the conversion utility.



10. Close the window.

## Appendix II Temperature sensors

### OEM temperature and relative humidity sensors

The OEM temperature and relative humidity (RH) sensors supported by NetCommander can be supplied in a temperature only, relative humidity only, or a combined temperature and relative humidity package. The devices do not require any external calibration and have typical accuracy's of  $\pm 1/4^{\circ}\text{C}$  /  $\pm 3\%$  RH at room temperature and  $\pm 3/4^{\circ}\text{C}$  /  $\pm 5\%$  RH over the full  $-10$  to  $+70^{\circ}\text{C}$  temperature range ( $0$ - $50^{\circ}\text{C}$  over  $0$  - $100\%$  RH for RH sensor). NetCommander comes pre-configured with the correct scaling functions to accept the devices with very little extra configuration.



The OEM combined temperature and RH sensor

The temperature sensors can be supplied with mini-DIN leads that connect into the NetCommander interface.

**OEM sensor technical specification**

Parameter	Temperature	Relative Humidity
Operating range	0-50°C (standard) -10 to +70°C (wide range)	10-90% RH standard 0-100% RH wide range
Output signals	4-20mA or 10mV/ °C configurable or % RH	
Power supply	9Vd.c. - 30Vd.c. $\pm 10\%$	
Accuracy		
Output	12Va.c. - 24Va.c. -10%, +15%	
Humidity		<b>Standard</b> +/-3% @ 25°C, +/-6% from 0-50°C over range 10-90% <b>Wide range</b> +/-3% @ 25°C, +/-5% from 0-50°C over the range 0-100% RH
Temperature	<b>Standard</b> +/-0.4°C @ 25°C +/-1.2°C from 0-50°C <b>Wide range</b> +/-0.2°C @ 25°C +/-0.7°C from -10 to 70°C	
Time constant (in still air)	300 seconds	60 seconds
Dimensions	H80mm W125mm D29mm	

**CubeRoot temperature sensors**

The CubeRoot temperature sensor utilises a precision semi-conductor temperature sensor mounted in a standard mains patress and coverplate. The device does not require any external calibration and has a typical accuracy of  $\pm 1/4$  °C at room temperature and  $\pm 3/4$  °C over the full -55 to +150 °C temperature range.

**Cuberoot temperature sensor technical specification**

Parameter	Standard	Wide range
Temperature range	0 to +100°C	-40 to +110°C
Accuracy @ 25°C	$\pm 0.9$ °C (typical)	$\pm 0.4$ °C (typical)
Operating Voltage	+30V to +4V	
Max. Voltage	+35V -0.2V	
Quiescent current @ 5V	91mA (typical)	

**This page has been left blank intentionally to record your notes and configuration information**